



Ki te ako āhuarangi tōnui ki Aotearoa | Towards flourishing climate education in Aotearoa New Zealand

Ngā rangahau whakapūaho mai i ngā mātākōrero |
Case studies and perspectives from the literature

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He whakarāpopototanga | Summary

Climate change presents escalating risks to young people and communities, including risks to the achievement of educational outcomes. Education can play a key role in supporting society in making transitions to a climate-changed, low-emissions future. There have been calls for transformational approaches to enable education to fulfil this role. However, comprehensive approaches to climate education have been slow to develop in most countries, including Aotearoa New Zealand. This report draws on literature from te ao Māori and Western/global perspectives, and from six case studies, to explore the question, “What does it look like when climate education is flourishing?”.

Perspectives from Māori and Indigenous literature

Terms like “climate education” and “environmental education” have been critiqued by Indigenous authors as not reflecting holistic, relational, Indigenous worldviews. From a Māori perspective, “flourishing” embodies a profound interconnectedness with the world, deeply rooted in mātauranga Māori concepts such as whakapapa and taonga. At the heart of Māori identity lies whakapapa, the ancestral knowledge that intricately weaves together the past, present, and future, and underscores the interconnectedness of all beings and elements. Furthermore, “flourishing” extends beyond individual hauora or wellbeing, to encompass holistic prosperity for communities and the taiao. “Flourishing” can also entail meaningful connections within whānau and community, where Māori values such as manaakitanga and kaitiakitanga are upheld. “Land-based education” or other Indigenous language terminologies are used to describe learning that supports interconnected forms of flourishing. Indigenous climate change literature highlights the interconnected impacts of colonialism for people, lands, and the climate. This literature highlights the need to uphold Indigenous people, language, and knowledge as part of the solution to climate and environmental issues. Māori climate change literature brings te ao Māori and Te Tiriti o Waitangi-based frameworks into the foreground; for example, the Rauora (abundance) framework for climate transition (Ihirangi, 2021), and the notion of a “tika” transition to a low-emissions Aotearoa (Bargh, 2019).

Perspectives from Western–global literature

From Western–global perspectives, there is a growing literature that describes what effective climate education practices should involve. This research indicates that effective climate education comprises more than just acquiring knowledge *about* climate change. Terms such as “education for climate justice” and “action for climate empowerment” convey the transformational and action-oriented outcomes that are envisaged in tandem with knowledge outcomes. These ideas have roots in over 50 years of environmental-sustainability education research and practice. Climate education also has some distinctive aspects; for example, the need to develop knowledge and systems-thinking capabilities in relation to the interconnected biophysical and social systems involved in global warming and climate change, learning what can be done to slow down global warming, and what sorts of adaptations will be necessary as conditions change.

A variety of frameworks illustrate the multifaceted dimensions of climate education and provide educators with guidance about how to put these into practice. These include the Bicycle Model (Cantell et al., 2019), the Hope Wheel (Finnegan & d'Abreu, 2024), and Draft Guidelines for Excellence in Educating for Climate Action and Justice (NAAEE, forthcoming). There is also locally-developed guidance for approaches within Aotearoa New Zealand. Across the literature, the enabling or constraining features of wider school norms and system-wide settings are also recognised as key factors in shaping the space within which climate education practice can flourish (McKenzie, 2022; UNESCO & MECCE, 2024).

This report shares six case studies. These show a variety of approaches, reflecting the diversity of learning approaches evident in the climate education literature. Eight themes emerged from analysis across the cases.

A desire to do something positive

Teachers and leaders believed that climate/sustainability/environment/whenua-based learning was serving a need for young people, by enabling them to feel they could make a positive difference. The case studies involved teachers who were willing to trying new practices and approaches, supported by people in key leadership positions. Learners also said they wanted to feel that they could make a positive difference.

Practical activities as a route to learner engagement and wellbeing

Learning often involved hands-on activities such as environmental restoration, growing food, repairing clothes, painting murals, and doing things in and for the community. Learners and teachers felt empowered when they could take tangible actions, and see that wider-scale issues could be broken down into smaller-scale, and often localised, actions. Working collectively with others (including other learners, or people from the wider community) helped learners to feel like they were not on their own in trying to make a difference.

Different scales of action-taking

Most cases involved students taking actions aimed at having a positive social/environmental impact. Some projects were individual, and some involved working as a collective. Some involved working directly in/on whenua, and others involved seeking to influence decision-making; for example, local or national adaptation planning. One interesting reflection is how schools might find the balance between learner-led projects, which may only exist while those students are involved, and collective projects that may be long-term and additive.

Time (space) and place (whenua)

Several cases involved purpose-driven reorganisation of timetables to create more spaciousness for learners and teachers to get deeply into their environmental–climate learning. Strong connections to place and whenua were of central importance in some cases. Across cases, we also heard about various ways in which people wished there was “more time”—including more time to make connections to people, places, and climate–environmental projects in their local areas. Curriculum and assessment arrangements and other school norms around the use of time and space were discussed as limiting factors.

Relational networks, leading to emergent opportunities

Another theme across several cases was the crucial importance of networks of supporting relationships with people and groups in the community. These relationships often had a reciprocal aspect. Learners could benefit from expertise, time, and resources that other people and groups could bring to their learning environment, while at the same time learners' activities were often intended to provide benefits to the community (e.g., growing food to share, teaching others how to grow food, or building a rongoā garden). Relationship networks also allowed for emergent projects and opportunities, including collaborations.

Beyond-school learning as an auxiliary to in-school learning

Climate education also occurs in settings outside “formal” education spaces, including youth-led and community-based climate action groups, and facilitated programmes. Some case study examples such as the Next Generation Conversation provided ways to augment or work around the limitations of what schools may be able to offer due to constraints of time, space, or expertise in climate education.

“Climate change” knowledge and concepts not always foregrounded

One very interesting observation was the variation in the extent to which “climate change” and other related climate concepts were, or were not, explicitly and routinely discussed. The literature supports the notion of climate education as broad, holistic, and interconnected with wider matters of environmental and social justice and wellbeing. From this perspective, all learning that involves developing a sense of care and connection to the environment, and building knowledge and capabilities that support the continued flourishing of the living world, are aspects of climate education. However, there is also a case to be made for more explicit scaffolding to ensure that learners can explicitly connect these understandings to broader climate change frameworks.

Connection to te ao Māori, and localised histories

The degree to which climate and sustainability learning involved connections with te ao Māori varied across contexts. Students and teachers across contexts often expressed interest in strengthening connections to te ao Māori across their climate, sustainability, and environmental learning. Similarly, there was interest in learning more about local histories of place. Teachers often commented on the need to keep building their own knowledge and connections to knowledgeable others.

Conclusion

These case studies shed light on some of the opportunities for climate-responsive education to “flourish”, while also illustrating some challenges that teachers, learners, and school leaders may experience in seeking to initiate and sustain deep sustainability and climate learning.

The literature indicates that for climate education to flourish across the system, policy supports would need to include interdisciplinary curriculum guidance, teaching resources, teacher professional development, and clarity of long-term vision about the role of education in a world impacted by anthropogenic climate change.

1. He kupu whakataki | Introduction

Since 2019, NZCER has been researching educational policy and practice for a climate-changing Aotearoa New Zealand. Through national surveys, in-depth interviews, and analyses of national and international literature, our work has explored how climate and sustainability education is currently understood and practised, what policy settings enable or constrain climate and sustainability learning, and what different people think is needed for climate-responsive education in Aotearoa New Zealand.

Climate change is a complex issue, with complex intersections across all aspects of human society. Because education both serves and is shaped by society, it follows that climate change has complex implications for education. Compared with other aspects of education that have been researched extensively for decades—for example, how to teach reading or mathematics—the question of how education can or should respond to climate change is less discussed. However, research and activity in this space is rapidly growing, and the key messages about what is needed are generally quite consistent.

The escalating risks of climate change

The international scientific consensus is very clear on the current state and projected future risks of climate change. Synthesising all the available information, a March 2023 report by the Intergovernmental Panel on Climate Change (IPCC)¹ indicated that:

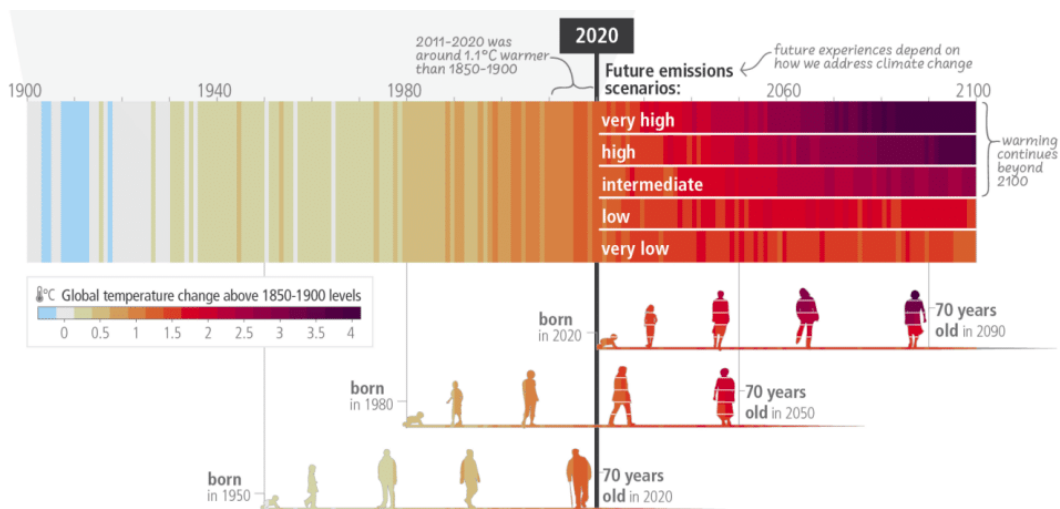
- Human activities, principally through emissions of greenhouse gases (GHG), have unequivocally caused global warming.
- Based on current data and policy settings it is likely that warming will exceed 1.5°C during the 21st century and make it harder to limit warming below 2°C.
- GHG emissions have been produced through historical and ongoing unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production.²
- Global warming has had widespread adverse impacts and related losses and damages to nature and people, with disproportional impact for vulnerable communities who have historically contributed the least to current climate change.
- Some changes are now unavoidable and/or irreversible but can be limited by deep, rapid, and sustained global greenhouse gas emissions reduction.
- Adaptation options that are feasible and effective today will become constrained and less effective with increasing global warming.
- With increasing global warming, losses and damages will increase, and additional human and natural systems will reach adaptation limits.

1 The IPCC, the United Nations body for assessing the science related to climate change, provides regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation. New Zealand is one of the IPCC's 195 Member countries.

2 Contribution sources are unequally spread across global regions, between and within countries, and among individuals.

To a sector concerned with supporting young people and equipping them with knowledge and skills for their future, this information should be of concern. The IPCC report is clear that “the extent to which current and future generations will experience a hotter and different world depends on choices made now and in the near term” (p. 7). An IPCC infographic (Figure 1) underscores the difference in warming impacts likely to be experienced during the lifetimes of someone born in 1950 or 1980, compared with someone born in 2020, under different emissions scenarios.³ Many young people around the world, aware of the disproportionate impacts they are likely to experience, have been vocal in urging their governments to take faster action on climate change.

FIGURE 1 Global temperature change likely to be experienced during a lifetime (Source: IPCC AR6)



Even in terms of conventional educational achievement goals, climate change risks are growing. Recent research has identified multiple direct and indirect pathways that are “probably already undermining education outcomes⁴ for many populations worldwide” (Prentice et al., 2024, p. 214). This research suggests that policy action must include short-term adaptations (e.g., retrofitting schools), as well as long-term investments that will help to limit the extent of exposure to climate stressors across the human lifecourse, including pre-birth and in early years, that can undermine children’s cognitive, social, and emotional development (Figure 2).

³ The original infographic and explanatory information can be found here: <https://www.ipcc.ch/report/ar6/syr/figures/figure-spm-1>

⁴ Including academic attainment and achievement, school access, attendance, and completion rates.

FIGURE 2 Pathways and processes linking climate stressors to altered education outcomes (Prentice et al., 2024). Reproduced with permission from Springer Nature.

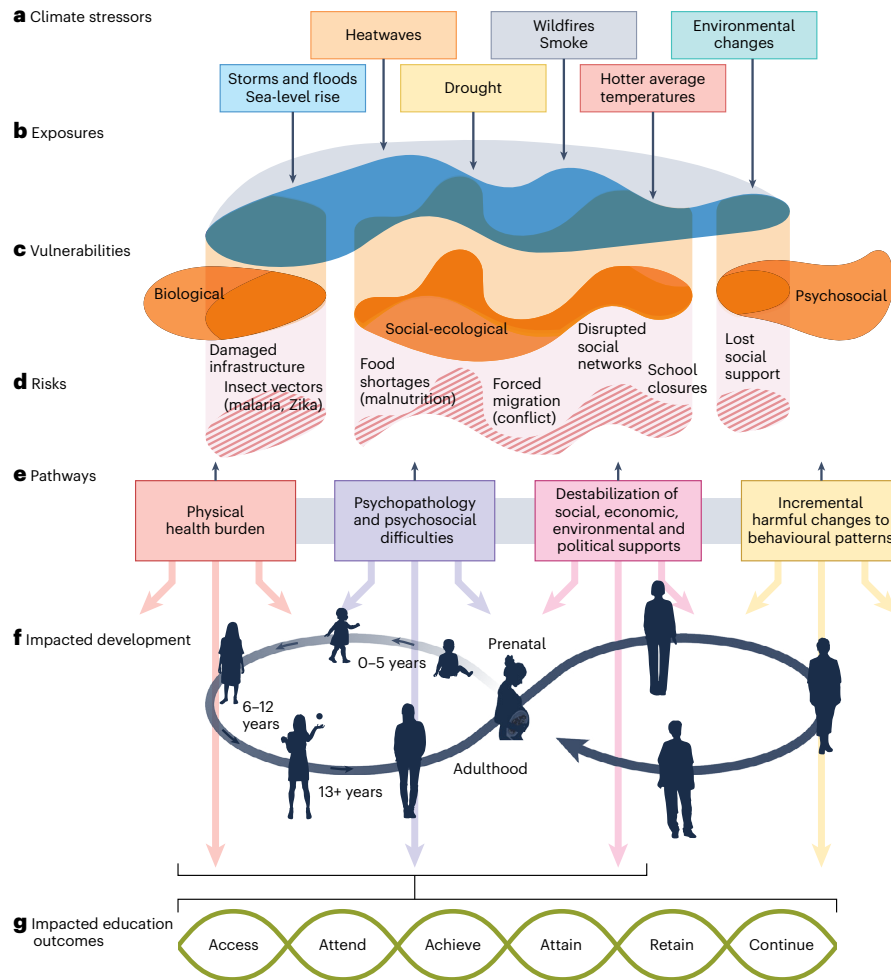


Fig. 1 | Pathways and processes linking climate stressors to altered education outcomes. a–g. Climate change drives the increased frequency, duration, unpredictability and severity of climate stressors (a), resulting in exposures that range from mild to severe (b), which interact with underlying vulnerabilities (c) to produce risks (d) that can lead to one or more impacts occurring through

four main pathways (e), such as disrupted healthy physical and psychosocial development (f) or direct reduction to education access, attendance, achievement, attainment, retention and continued learning (g). Pathways are not mutually exclusive and may operate in isolation, in parallel, interactively or cumulatively across time to harm education outcomes.

What can be done about climate change?

In the global climate-response policy sphere, several key concepts are central to policy, action-planning, and resource allocation (Table 2).

TABLE 1 Key ideas in policy response to climate change

Emissions reduction (or “Mitigation”)	Taking action to put less carbon dioxide and other greenhouse gases ⁵ into the atmosphere in order to slow down and reduce global warming and climate change.
Adaptation	Dealing with the impacts of climate change. This involves anticipating, planning, and preparing for the changes that will occur in our lifetimes and for future generations—given that some temperature rise can no longer be prevented or reversed.
Just transitions	Ensuring that the economic, social, and cultural transitions necessary to achieving both emissions reduction and adaptation are equitable and socially just.

New Zealand is a party to the Paris Agreement, an international treaty that commits members to take action to limit global temperature rise and adapt to its impacts. New Zealand’s progress on climate action is monitored by an independent Climate Change Commission.⁶ In May 2022, New Zealand’s first three (carbon) emissions budgets were set,⁷ and first Emissions Reduction Plan was released. New Zealand’s first National Adaptation Plan was released in August 2022.⁸ An Equitable Transitions Strategy has been signalled,⁹ but at the time of writing this report, no information was available about the status of such a strategy.

Each of these strategies and plans has touchpoints in education. Although emissions reduction, adaptation, and climate justice / equitable transitions do not drive much of the day-to-day thinking in education, climate-focused policy and action have implications for many other core aspects of educational practice. These aspects include curriculum, teaching and learning, school property and infrastructure, student health and wellbeing, attendance, community engagement and involvement, community resilience, educational pathways to further learning and work, and knowledge and skills needed for a transitioned economy and society, to name just a few.

Education’s role in contributing to a safe climate future

Education has a clearly-signalled role in global climate action agreements.¹⁰ The global discourse on education’s potential to contribute to a safe climate future signals the need for transformational approaches, and swift action. An OECD working paper released in early 2024 notes that due to the speed of climate change, there is “a rapidly closing window of opportunity to achieve profound transformations across sectors, systems and mindsets to secure a sustainable and liveable future” (Nusche et al., 2024, p. 4). Examining the role education systems can play “as drivers of transformative

5 For example, methane and nitrous oxide.

6 As outlined in the Climate Change Response Act 2002.

7 Setting carbon budgets for the periods 2022–2025, 2026–2030, 2031–2035 to achieve New Zealand’s legislated 2050 emissions reduction targets.

8 <https://environment.govt.nz/publications/aotearoa-new-zealands-first-national-adaptation-plan/>

9 This was originally expected to be due for release in draft form by June 2023, to be finalised in June 2024.

10 Article 6 of The United Nations Framework Convention on Climate Change (UNFCCC) concerns “Education, training, and public awareness”.

change”, the OECD paper identifies several potential leverage points for education policy “to accelerate such change”. These include:

- foregrounding more holistic, cross-curricular, and place-based approaches
- shifting the emphasis from “individual” to “collective” action; and
- making school systems climate-change resilient.

There is a substantial research base to build on in shaping climate-responsive educational policy (Feinstein & Mach, 2020; McGrath & Deneulin, 2021) and practice (Kwauk & Casey, 2021; Monroe et al., 2019; Rousell & Cutter-Mackenzie-Knowles, 2020). Since COP28 in December 2023, 45 countries have endorsed a climate and education common agenda declaration¹¹ committing to actions to adapt, mitigate, and invest in tackling climate change through education.¹² The UK is one of the first jurisdictions to have developed a sustainability and climate change strategy for education.¹³

In the years NZCER has been researching climate-responsive education, we have noted a steady increase in activity, interest, and concern about climate change amongst educational policymakers, school leaders, and educators in Aotearoa New Zealand. We have also noted scattered references to education, schools, and young people in New Zealand climate action policy. However, global and national concerns about the environment and sustainability—and, more recently, climate change—have not necessarily led to a clarity and consistency of purpose, policy direction, and practices to support education’s role and contribution in the context of a climate-changing world.

NZCER’s climate change research adds to other local research on climate-responsive education in Aotearoa New Zealand (e.g., Birdsall et al., 2023; Bolstad 2024), helping to illustrate what this type of education can look like in practice in schools, classrooms, and other learning settings.

11 See <https://www.unesco.org/sites/default/files/medias/fichiers/2023/12/Declaration-on-education-and-climate-change-en.pdf>

12 See <https://www.unesco.org/en/articles/declaration-common-agenda-education-and-climate-change-cop28>

13 See <https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy/sustainability-and-climate-change-a-strategy-for-the-education-and-childrens-services-systems>

Findings from previous phases of this research

In previous phases of our research we surveyed teachers and school leaders in English-medium primary, intermediate, and secondary schools (Bolstad, 2020a; 2020b). These surveys identified that many teachers and school leaders were concerned about climate change and the impacts it will have during students' lifetimes. Many primary schools reported a focus on practices such as waste reduction and gardening activities. While there was a focus on sustainability and environmental learning, climate change was less of a focus. Amongst secondary schools, science and social science subjects were the most likely to address climate change in the classroom, although some secondary schools offered specific sustainability classes or integrated/cross-curricular programmes, and some teachers wove a climate change focus into other learning areas including English, the arts, languages, technology, mathematics, and health and physical education. Whole-school focuses on sustainability or climate were uncommon amongst secondary schools, though schools did tend to support student leadership in these areas.

Interviews

We also interviewed 17 individuals to provide an in-depth, qualitative perspective on the role of education with respect to climate change (Bolstad, 2020c). Interviewees were selected to include five different kinds of perspective groupings. These were: youth (aged 16–25); educators; Māori; Pacific New Zealanders; and people with academic or policy expertise on climate change and/or the education system. Interviewees said that education offers important opportunities for diverse children and young people to engage in positive, solutions-focused climate learning and action. Their experiences highlighted that localised innovation is possible, particularly when young people and communities are informed about the causes and consequences of climate change, and are engaged with what they can do to make a difference. However, interviewees said such innovation was often down to individual teachers, students, and schools, noting that effective responses to climate change are enabled or limited by wider systems, societal and political structures, norms, and mindsets that may be difficult to shift.

The significance of worldviews

Interviewees also discussed the consequences of different worldviews on human relationships to climate and the environment, a theme that is also prevalent in the literature. The structural embeddedness of worldviews that position humans as having dominion over the natural world, or view the environment as a resource to be exploited, were discussed as significant drivers for current environmental and climate problems, and a challenge and constraint for climate and sustainability education. Worldviews that position humans as part of the natural world, needing to live in balance with nature—such as Indigenous Māori and Pacific worldviews—were discussed as holding many solutions for better ways to live within the natural world. However, interviewees also cautioned about the need to support Indigenous knowledge and people without “romanticising” or “appropriating” knowledge that was not their own, or inappropriately forcing it into non-Indigenous or colonial frameworks.

Questions guiding this phase of the project

In line with the need for a wide-ranging research frame, the research questions pursued within this project have evolved as the project has progressed. At various points we sought input from a range of key stakeholders and research participants about what kinds of research focuses and outcomes they would find most useful.¹⁴ Five high-level research questions emerged through these processes.

1. What is happening in education settings where climate change education and action is flourishing?
2. What do young people want from their education settings (e.g., schools) in response to climate change?
3. What do/can effective Te Tiriti-based climate responses look like in education?
4. In what ways do tikanga Māori and mātauranga Māori contribute to climate change mitigation and/or adaptation practices in education settings?
5. How are kura Māori approaching climate change and climate change education?

Together, these questions represent an ambitious and complex research agenda. For questions 1 and 2, there is a global climate education research literature against which to compare and contrast findings from Aotearoa New Zealand. Questions 3, 4, and 5 are of specific importance in the context of Aotearoa New Zealand. Exploration of these questions can be contextualised against other local research and international Indigenous-led research on climate, sustainability, and environmental education.

This report mainly focuses on research question 1, but begins to address some of the other questions to differing extents. To date, our school-based fieldwork has mainly focused on English-medium education settings. While we have not worked directly with kaupapa Māori education settings in this project, we have taken care to seek out and highlight insights, experiences, and perspectives from Māori scholars, educators, and researchers working in kaupapa Māori spaces, through our literature searches and in-depth interviews. This has also informed our approaches to research and analysis in English-medium settings which have included Māori participants, themes around Māori knowledge, and in some cases, pedagogies from a te ao Māori perspective (Hemara, 2000).

He Awa Whiria—braided rivers

We are conscious of bringing multiple perspectives into our analysis. He Awa Whiria or braided rivers (Macfarlane et al., 2019) is a research framework that provides a pathway for respectful interplay of “knowledge that flows from different, yet potentially complementary streams”—in this case, Māori and Western knowledge streams, and can support “more culturally robust, inclusive, and sustainable research findings” (para 2). He Awa Whiria has both metaphorical and literal resonances for this research. Several of the case study schools in this report were physically adjacent to awa, streams, and rivers.

These awa were an active context for students’ environmental and climate learning and connection—as mahinga kai, as a way of learning about the social and environmental histories of their place, as a place for students to engage in hands-on care for their environment.

¹⁴ The high-level direction of the research has also been shaped with NZCER’s four strategic priorities (2020–2025) in mind. These are: 1) Decolonising education, 2) Upholding mana Māori, whakamana Māori, 3) Improving equity for ākonga and equity in education, and 4) Influencing the future of education.

Thinking about awa highlights the importance of being able to look at things from multiple perspectives. For Māori, water has mauri, as do all things. Water is taonga, is part of the environment, the land, and the people, and all are connected through whakapapa to Ranginui and Papatūānuku. To respect and care for water and all other parts of the environment is to care for people: past, present, and future. It is common to find freshwater or marine environments as a context for learning in both Māori-medium kura, and English-medium schools, all over Aotearoa New Zealand. While local framings and purposes will vary (and these differences may be quite significant), it is common to find holistic and interdisciplinary learning activities traversing science, education for sustainability, mātauranga Māori, cultural and social knowledges, local histories, hands-on actions such as planting and water quality monitoring, collaboration with other people and groups in the local community, and activities to raise community awareness and encourage action.¹⁵

Schools' proximity to water takes on further significance in the context of a changing climate. With more frequent and extreme weather events, recent Ministry of Education assessments indicate that 1,102 schools and kura—around 44% of all schools and kura—are at some risk of coastal, surface, and river flooding.¹⁶ These risks vary from relatively low impact (e.g., flooding of carpark or fields) to more serious (more than 50% of buildings affected). In the storm and cyclone events of early 2023, over 500 North Island schools experienced impacts.¹⁷ Though most schools and kura were able to reopen within days or weeks, some schools were still unusable more than a year later.¹⁸ Regardless of whether school properties are affected, learners and communities may experience direct impacts to homes and infrastructure (roading, bridges), as well as longer-lasting social, emotional, and economic consequences. An NZEI report (NZEI, 2024) and multiple stories in *Education Gazette* highlight the role that schools played in stepping up to support community recovery and resilience in 2023. Research demonstrates that in times of disaster, schools act as hubs and communities, and educators often play the role of “quiet heroes” in supporting communities through the immediate and long-term processes of recovery (Mutch, 2015), often with little external support. This raises equity questions, particularly for communities that may have more complex support and recovery needs. As one principal commented after the 2023 Auckland Anniversary Weekend floods,

I think that collectively we need to grow resilient communities that can face these kinds of things. Also, the structures shouldn't always be reliant on schools being able to set up what we've set up (Lou Reddy, Principal)¹⁹

The complex ways in which all these threads intersect highlight the need for deep and critical analysis in exploring what flourishing climate education might look like in Aotearoa New Zealand. Pertinent questions to consider include:

- What kinds of knowledge and practices might best serve the needs of young people and communities in learning to mitigate and adapt to a climate-changed future?
- How can we best equip diverse young people and their communities to confidently engage with meaningful, motivating, solutions-focused climate learning and action?
- How can educators ensure that individual and collective wellbeing is central in these processes?
- How much priority, time, support, and resourcing are given to these kinds of learning?

15 Such as mural-painting, sign-painting, school productions, and other forms of community messaging.

16 See <https://www.education.govt.nz/our-work/changes-in-education/coastal-flood-risk-management-project/>

17 <https://www.beehive.govt.nz/release/govt-repair-or-rebuild-all-weather-hit-schools>

18 <https://www.rnz.co.nz/news/national/513662/mormon-church-doubles-as-school-after-cyclone-and-flood>

19 See <https://gazette.education.govt.nz/articles/schools-as-community-hubs-in-emergencies/>. See also <https://gazette.education.govt.nz/articles/tu-kaha-how-coromandel-schools-build-resilience-and-weather-storms/> and

Recognising that the climate crisis has not come from nowhere, but is the product of historic and ongoing industrialised social and economic human activities, we might also ask:

- Which historic and ongoing economic, social, cultural, and colonial processes have contributed to present and projected climate change risks for schools, kura, and the young people and communities they serve?
- Which historic and ongoing economic, social, cultural, and colonial processes have contributed towards framing what kinds of learning are valued and prioritised within educational settings, and what kinds of learning are less of a priority?
- What is our collective capacity to reimagine learning and education to serve the goals of a flourishing and abundant future for people and the planet?

The case studies

In 2022 and 2023, we explored climate and sustainability education approaches at four school sites, with a few additional interviews at other sites. Our connections to these sites emerged from existing relationships, and from people reaching out to us. The 2 years over which field work took place were pressured times for schools²⁰ and our research team. As a result, we were able to do fewer case studies than we had hoped. However, we discovered that in the schools we engaged with, there was often more than one “stream” of activity to explore in relation to climate-responsive education. For example, in some schools there was a timetabled course that had an explicit environment-sustainability-climate learning focus, and there were other climate-responsive things happening in other parts of the school (e.g., in another class, or in student leadership spaces). By following these threads, we saw diverse ways in which climate and sustainability learning and practice can be manifested. We also saw some of the challenges for climate-sustainability-environmental education to find purchase as a normalised priority for school learning.

In this report, we present the case studies as separate stories, braiding them together with themes from the literature, to uncover common themes, challenges, opportunities, and divergences in considering what “flourishing” climate education in Aotearoa New Zealand might look like. The next section explores recent research and other literatures to provide a context for the case studies.

²⁰ Schools were still experiencing rolling waves of COVID-19, and teachers were taking industrial action in 2023.

2. Ki te ako āhuarangi “tōnui” | Towards “flourishing” climate education

Exploring the literatures

This section explores key literatures that help to frame our use of terms like “flourishing”, “climate education”, and related concepts. Climate change is a global problem that can only be addressed through global action. There is a growing body of knowledge that describes what “good” climate education practices should involve. As discussed in the introduction, the overall call in the literature is for a transformational, multi-layered response.

... just as there is no single solution to climate change, there is no single educational approach ... Decisionmakers must understand that they should not stop at a single education reform, but enable multiple policy pathways, unlock the financing mechanisms, and unleash the networks of educators and civil society organizations to transform education as we know it. (Kwauk, 2021, para 6)

It is also important to look specifically at the local view within Aotearoa New Zealand, and to challenge some of the dominant concepts, language, and framings used in Western and global literatures on climate and education. It is essential to understand the significance of worldviews and their embeddedness in language. Te ao Māori provides an ontological framework for understanding the nature of relationships between people, place, and the more-than-human world. Notions of education, climate change, and many other things are conceptualised differently from a Western or English-language point of view. Indigenous authors have pointed out the ways in which language concepts in English²¹ (such as “climate” or “nature” or “environment”) carry within them an implicit worldview of separation and dualism that is inconsistent with Indigenous worldviews that are holistic, interconnected, and relational (Reed et al., 2024; Taiapa et al., 2024).

It is also important to consider the social and historical contexts that have shaped current thinking, practices, and norms in relation to education and climate change. As we will discuss later in this section, the field of climate education has evolved over time towards holistic, action-oriented frameworks that include an emphasis on environmental and climate justice. Some assert that climate and environmental justice “can only take place with Indigenous peoples and epistemologies at the centre” (Tuck et al., 2014, p. 17), advocating for educational approaches that honour and centre “Indigenous relationships with the land and all of creation” (Bowra et al., 2021, p. 132). The climate action and climate education literatures also highlight the need to understand the interconnected impacts of colonialism for people, lands, and the climate. For these reasons we begin by exploring notions of flourishing from a Māori perspective, and by discussing Indigenous literatures on climate education as “land-based education”. We then move on to other key trends in global and national sustainability and climate education research.

21 And other languages.

“Flourishing” from a Māori perspective

From a Māori perspective, “flourishing” embodies a profound interconnectedness with the world, deeply rooted in concepts such as whakapapa, taonga, and mātauranga Māori. At the heart of Māori identity lies whakapapa, the ancestral knowledge that intricately weaves together the past, present, and future (Burgess & Moko-Painting, 2020). This sacred lineage not only explains the creation of the universe but also underscores the interconnectedness of all beings and elements. Leather and Hall (2004) explain how whakapapa is woven into every aspect of existence, from tangible elements of Te More (male and female element) to the intangible concepts of Te Kore (the void), emphasising the deep bond Māori share with the cosmos. Consequently, whakapapa serves as an unbroken thread linking past generations to the present, encompassing all that is transmitted from one era to the next (Berryman, 2008).

In practical terms, “flourishing” extends beyond individual hauora or wellbeing to encompass holistic prosperity for communities and the taiao (Rākena, 2020). Māori hold a deep reverence for the signs of the taiao, recognising them as a boundless wellspring of interconnected wisdom that permeates all aspects of life. Over generations, Māori have cultivated a relationship with their geographical location, resulting in comprehensive insights into its structure and processes. This knowledge of the taiao is conveyed and passed down through whakapapa as a means of understanding both the physical and spiritual world (Rameka, 2018). The Maramataka offers valuable insights into the rhythms and cycles of the natural world (Rākena, 2020). By aligning activities with the Maramataka, individuals and communities can optimise their interactions with the taiao, promoting sustainability and harmony.

“Flourishing” can also entail meaningful connections within whānau and community, where Māori values such as manaakitanga and kaitiakitanga are upheld. Kura and schools incorporating mātauranga Māori into their practices, such as the Maramataka, honour and celebrate Māori identity and traditions. They foster a sense of belonging, agency, and pride among ākonga and communities, empowering them to thrive in both traditional and contemporary settings (Henare, 2007; Rākena, 2020).

The paragraphs above merely skim the surface of what “flourishing” means in te ao Māori, and how it is given expression through kaupapa Māori education practices. As one kaiako put it,

Ka whai i te marautanga o te ao Māori. (We follow the curriculum of the Māori world).²²

Concepts and practices that are foundational, central, and normalised in kaupapa Māori education settings may be difficult to fully understand or realise within English-medium education, although some aspects may be present to differing extents.

Decolonising perspectives

The links between colonialism, climate change, and biodiversity loss have been identified in the global literature (IPCC, 2022), with entangled impacts on Indigenous peoples’ culture, language, land stewardship, and self-determination (IPBES, 2019). Indigenous knowledge and land stewardship practices have been identified as critical for protecting biodiversity (Estrada et al., 2022) and mitigating climate change; for example, through protection of remaining natural global carbon sinks.²³ Research has also identified the relationships between linguistic diversity and biological diversity (Glorenflo et al., 2012), and the linked extinction risks faced by Indigenous languages and biodiverse species (Estrada et al., 2022).

²² Cited in Bolstad & Keane, 2018, p. 17.

²³ <https://www.wri.org/insights/amazon-carbon-sink-indigenous-forests>

In countries where Indigenous peoples have experienced interruption to ways of living, learning, and being through colonisation, colonial education systems have typically played a key role in processes of assimilation and efforts to diminish indigenous language and practices. This is the case in Aotearoa New Zealand, producing significant decline in te reo Māori language use in the 20th century (Higgins & Keane, n.d.; Ka'ai-Mahuta, 2011). Through resistance to these systems and reclamation of Indigenous languages and practices, Māori and other global Indigenous education leaders and communities have actively worked to revitalise and renormalise traditional ways of learning and being.

Māori literatures on climate change research, policy, and action bring te ao Māori and Te Tiriti-based frameworks into the foreground (e.g., Bargh & Tapsell, 2021; Ihirangi, 2021; Reid et al., 2024; Smith, 2020). The notion of rauora or abundance is the starting point for the Rauora framework, an Indigenous worldview framework for national climate adaptation planning (Ihirangi, 2021). Māori values and principles are used to outline a pathway for working together to redress root causes of climate impacts, and achieve an “eco system-based, sustainable and responsible approach to development within the limits required to restore abundance and ensure intergenerational equity” (Ihirangi, 2021, p. 17). Maria Bargh advocates for a “tika” transition to a flourishing Aotearoa, defined as a transition that “embraces tikanga Māori as a source of solutions, upholds Te Tiriti o Waitangi and is consistent with the UN Declaration on the Rights of Indigenous Peoples (UNDRIP)” (Bargh & Tapsell, 2021, p. 13). Policies related to land, environment, and climate change must be worked out through shared decision-making in a “joint sphere” between iwi, hapū, and Māori (the rangatiratanga sphere) and the Crown (kawanatanga sphere) (Bargh & Tapsell, 2021).

Land-based education

The term “land-based education” (or “land-based learning”) is often used in Indigenous literature on climate and environmental education.²⁴ Several themes are common in the land-based learning literature (Bowra et al., 2021). These include seeing “land as first teacher”, an emphasis on relationality, holism, land as a place of reflection, and being in “reciprocal relationship with all of creation.” (p. 139).

Being on the land allows the learner to experience and encounter Indigenous philosophy and the interconnectedness of all living and non-living things. (p. 135)

Practices associated with land-based education cannot be contained within a classroom. Land-based education is often community-initiated and community-run, bringing Indigenous youth together with Indigenous elders, and upholding Indigenous language and storytelling (Datta et al., 2024). It often involves learning through sustenance practices (hunting, fishing, food preparation). The land-based education literature also brings forward themes of Indigenous resistance to colonial structures—including educational structures—which “fail to acknowledge Indigenous histories and non-western ways of knowing, being, and learning” (Bowra et al., 2021, p. 133).

Together, these literatures indicate design features of educational approaches to support “flourishing” for Indigenous young people. Such approaches have intertwined goals to support flourishing of language, culture, traditional knowledges, and respect, care, and protection for the lands and environments to which they connect. New Zealand practice examples, such as Te Kura Taumata o

²⁴ This term is deliberately used rather than the often-used notion of “place-based” education (PBE). Some have argued that PBE can perpetuate erasure or minimisation of Indigenous knowledge, histories, and stories belonging to a land, and the impacts of colonisation in and on that land.

Panguru,²⁵ demonstrate how te ao Māori and mātauranga Māori can be woven together with Western science and ecological knowledge and practices to further support flourishing of ākonga, te reo me ona tikanga Māori, wellbeing of the local environment, and supporting ākonga towards further learning and career pathways.

In addition to documenting the opportunities and benefits of by-Indigenous, for-Indigenous approaches, some Indigenous researchers have critiqued “mainstream” climate education approaches that promote “feel-good, future-oriented solutions” that remain comfortably “rooted in the same modern/colonial system” that created the climate and environmental crisis that these solutions purport to solve (Stein et al., 2023). It is argued that in continuing to promote certain dominant ideas,²⁶ these approaches will fail to address and change the roots of unsustainable exploitation-based systems, and fail to create space for truly different ways of living and being to grow (or regrow) in their place.²⁷

One theme across both Indigenous and Western environmental-climate-sustainability education is the importance of enabling learners of all ages, including the very young, to develop a sense of reciprocal care, attachment, and belonging to the natural world that can be sustained throughout their lives, and to learn how to act with an awareness of how human activities are sustained by, and impact on, the environment. Indigenous framings highlight the importance of the specific, local, historical, and place-connected dimensions of this learning.

Global–Westernised perspectives on climate education

We turn now to an exploration of key themes that have emerged in more than 50 years of global environmental/sustainability/climate education research. Opportunities for learning about Earth’s climate systems have historically been dispersed across a range of disciplinary context, particularly in the sciences (Battacharya et al., 2020), with “climate education” or “climate literacy” emerging as more distinct concepts in the literature since the 1990s. The research clearly indicates that effective climate education comprises more than just acquiring knowledge *about* climate change. Other terms used in the literature include “education for climate justice”, and “action for climate empowerment” (ACE). These terms seek to convey the transformational and action-oriented outcomes that are envisaged in tandem with knowledge outcomes. Ideas about transformational and action-oriented learning in turn have roots in over 50 years of environmental-sustainability education research and practice. “Climate education” also has some distinctive aspects. For example, there is an emphasis on supporting learners to develop knowledge and systems understandings about the complex entanglement (Verlie, 2017) of biophysical and social systems involved in global warming and climate change. This includes learning about what can be done to slow down global warming, and what sorts of adaptations will be necessary as conditions change.

25 Winner of a 2021 Prime Minister’s Excellence in Education Award for Excellence in Engaging. See https://youtu.be/TtM0no50Uog?si=Bh_pb1KbuipfA7_o

26 For example, a belief that new technologies will appear just in time to fix things, or that existing unsustainable systems can be corrected through small changes.

27 Stein et al., have used the term “climate education otherwise” to describe an alternative approach, based on a five-layered healing approach “which seeks to prepare students with the stamina and the intellectual, affective, and relational capacities that could enable more justice-oriented ... responses to current and coming challenges” (p. 987). While Stein et al.’s work is directed towards tertiary/higher education levels of learning, there are powerful provocations within this work.

From “environmental education” to “education for a sustainable future”

The origins of environmental education as a global movement are often traced back to emerging concerns about global environmental degradation during the 1960s and 1970s. In 1972, the United Nations recommended that environmental education be recognised and promoted in all countries (UNESCO, 1997). The world’s first Intergovernmental Conference on Environmental Education was convened in Tbilisi (USSR) in 1977 (UNESCO, 1978). While these moves were well-received by many policymakers, academics, and environmentalists, the impact on formal education policy and practice in most countries was generally underwhelming (Gough, 1997). In the 1980s and 1990s, environmental education morphed into “education for sustainability”,²⁸ giving greater prominence to the social, political, and economic causes of environmental problems, and the need to simultaneously address issues of human poverty and economic development. The “Brundtland Report” (WCED, 1987, p. 16) famously defined “sustainable development” as:

... development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

The report asserted that with appropriate technological and social changes, it would be possible to achieve social equity and economic growth, while maintaining the environment. Though the notion of “sustainable development” has been heavily critiqued, this general framing has remained and expanded.²⁹ During the 1990s, references to sustainability and sustainable development became increasingly common in the national curricula in many countries (Gough & Scott, 2001).

Learning through critical analysis and action

Environmental education for a sustainable future (EEfS) has been defined as being: relevant, holistic, values-orientated, issues-based, action-orientated, critical education (Tilbury 1995). The notion of education “for” denotes an action-oriented approach where students work towards the resolution of environmental questions, issues, and problems (Fien & Greenall Gough, 1996). Fien (1994) located this kind of environmental education within the critical theory tradition of education, encouraging learners to identify and analyse competing social interests and forces that contribute to, or sustain, the degradation of the environment. However, while learning how to analyse and critique existing structures and practices is valuable, actually changing things can be extremely difficult and may be constrained by structures within which students (and teachers) operate.

The development of learners’ “action competence” has been advocated as a goal for EEfS (Breiting & Mogensen, 1999; Jensen & Schnack, 1997). This approach involves students in actively identifying problems, determining solutions, and *taking action* in a way that empowers them with capabilities they can utilise for the long term, and applying them in new contexts throughout their lives. Studies of approaches designed to build learner action competence in the United States and the Netherlands (Wals et al., 1997) and New Zealand (Eames et al., 2006) found that such approaches can be successful and rewarding for learners. However, the research showed that holding space for these approaches (which involve actually taking action, not just “learning about” doing so) requires time, energy, and commitment from those involved, and teachers need particular knowledge and expertise to do this well. The research also indicates the important mediating influence of school culture, including the

28 There are several versions of this term, including education for sustainable development, and education for a sustainable future, the underlying intentions of which are heavily debated.

29 Since 2015, the UN has championed 17 Sustainable Development Goals (SDGs) “as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity”. The goals include Quality Education (Goal 4) and Climate Action (Goal 13). See <https://www.undp.org/sustainable-development-goals>

extent of whole-school environmental and sustainability action and the extent of support for student empowerment, leadership, and power-sharing.

Whole-school approaches

Whole-school approaches to environmental sustainability have been encouraged in international literature, and have been identified as one characteristic of environmental and sustainability education approaches in New Zealand schools (Bolstad et al., 2015) in part due to the influence of Enviroschools.³⁰ At the heart of the Enviroschools approach is an Action Learning Cycle that encourages “an enquiry-based process of exploration, decision-making, design, action and reflection”.³¹ While there is great variability in the extent to which schools across Aotearoa New Zealand have adopted whole-school approaches to sustainability and climate-responsiveness, the theory behind the whole-school approach is that sustainability consciousness must operate across all aspects of a school. Eames et al. (2013, p. 15) described this in terms of four aspects:

- **People**—including the organisational structures of the school and the processes for student involvement in decision making, leadership, and community collaboration
- **Programmes**—including the formal and informal curriculum
- **Practices**—the systems and operations that manage the use of resources in the school
- **Place**—the physical surroundings and spaces within which learning occurs.

Worldviews and pluralism

Understanding that different worldviews frame our relationships to the environment in different ways—even if these worldviews are not immediately obvious to us—has been identified as another key aspect of environmental-climate-sustainability education. It is argued that learners must become capable of interacting with individuals and groups who think or act differently from themselves, to ensure responsible decision-making in a pluralistic and democratic society (Lijmbach et al., 2002). Pluralistic pedagogical approaches encourage learners to build an awareness of and ability to reflect on their own worldview, as well as being able to listen to and learn from the experiences, perspectives, and worldviews of others; for example, through “pluralistic classroom discussions” (Tryggvason et al., 2023). Yet teachers may face challenges implementing pluralistic approaches in practice. One challenge is having time and space for learners to discuss, debate, and explore different perspectives on complex environmental and social issues. Another is teachers having the knowledge and skills they need to help facilitate these discussions. There is also the question of how to work with pluralism in the context of “polarization of public debate and the rise [of] post-truth politics” (Tryggvason et al, 2023, p. 1461), where learners (or anyone) might hold opinions or perspectives on climate that are contradictory to established scientific fact and consensus; for example, denial of anthropocentric climate change.³² As we saw in one case study,³³ skilled teachers can use careful and respectful questioning, introducing learners to methods for critical analysis, and offering alternative views. However, time and teacher confidence may be limiting factors on whether or how effectively such views are addressed.

30 Enviroschools is a nationwide programme supported by Toimata Foundation, founding partner Te Mauri Tau, and a large network of regional partners, reaching more than 1,500 schools.

31 See <https://enviroschools.org.nz/about-us/resources/>

32 We encountered a student who expressed this perspective in one of our research interviews.

33 The Climate course at Ao Tawhiti—see Section 6.

Countering climate anxiety through pedagogies of hope and action-taking

A rising theme within climate change education in recent years relates to acknowledging, and working constructively with, the emotional, psychological, and spiritual responses that can arise as people learn about climate change and other ecological problems. The terms “climate anxiety” and “eco-anxiety” have emerged to describe some of these feelings. Concerns have been expressed in public debate around young people’s mental health and wellbeing in relation to climate education. Although some people hold the view that children and young people should be shielded from learning about climate change, the research indicates supportive dialogue can help young people’s meaning-making of climate change and the emotional aspects of these conversations (Beasy et al., 2023). Educators can help by creating spaces in which young people feel safe to share what’s on their minds and know that they will be listened to (Jones & Lucas, 2023). Educators can design climate and environmental learning grounded in opportunities for action, hope, and agency (Birdsall et al., 2023; Finnegan & d’Abreu, 2024) collective action-taking (Bolstad, 2024), and connection with the environment.³⁴

Environmental and climate justice

In recent years the pursuit of climate and environmental justice has been a central theme in the broader climate action movement (della porta & Parks, 2014). This call for justice has been particularly championed by youth and Indigenous activist movements, who understand climate change as “an issue of multi-faceted injustices—intergenerational, racial, and economic, to name only a few” (Trott et al., 2023, p.1535). The climate justice frame calls attention to an intersectional range of people and groups who experience climate and environmental injustice, and are often excluded from spaces of decision-making and action to address the climate crisis.³⁵ The climate justice frame brings the climate movement into closer alignment with a variety of other social movements that seek to highlight the needs, rights, voices, and aspirations of people and groups who are often those most affected by climate change and least “responsible” for creating the problem.

Trott et al., note the increasing prevalence of education for climate justice within and throughout community-based and activist contexts, including youth climate justice movements. However, in formal learning settings, international systematic reviews have suggested that “justice considerations” and “the political dimensions of climate change” are “rarely present” (Trott et al., 2023, p. 1533). Further, when climate justice is visible in the climate education literature, Trott et al., found the term is often underdefined.

Recent frameworks for holistic climate education

A variety of frameworks or guidelines draw together many aspects of the research literatures above to provide guidance on how to design holistic climate education. Next, we present three international models, and two local examples.

NAEEE Guidelines for excellence

A set of guidelines currently in development by the North American Association for Environmental Education (NAEEE) distils five “key characteristics” that “provide a framework for excellent, meaningful

³⁴ See <https://tewhariki.tahurangi.education.govt.nz/education-for-a-climate-changing-future/5637166344.p>

³⁵ These groups include, but are not limited to, Indigenous peoples, young people; people on low or unstable incomes; disabled people and people with chronic health issues; women, girls, and gender minorities; people whose homes, communities, and livelihoods are at risk because of climate change; and future generations—people who haven’t been born yet.

climate education focussed on climate justice and climate action”. The Guidelines suggest practices that reflect these characteristics (Table 2). The full guidelines document breaks these down into more detailed lists to help educational designers to consider what each of these practices might look like for different learners, in different contexts. The NAAEE Guidelines note that climate education can occur with learners of many different ages in a wide range of contexts, including within formal education settings and in community-based programmes. Therefore “not every climate education programme will follow all of the guidelines”, and educators would need to determine “which key characteristics, guidelines, and indicators are applicable in their situation”.

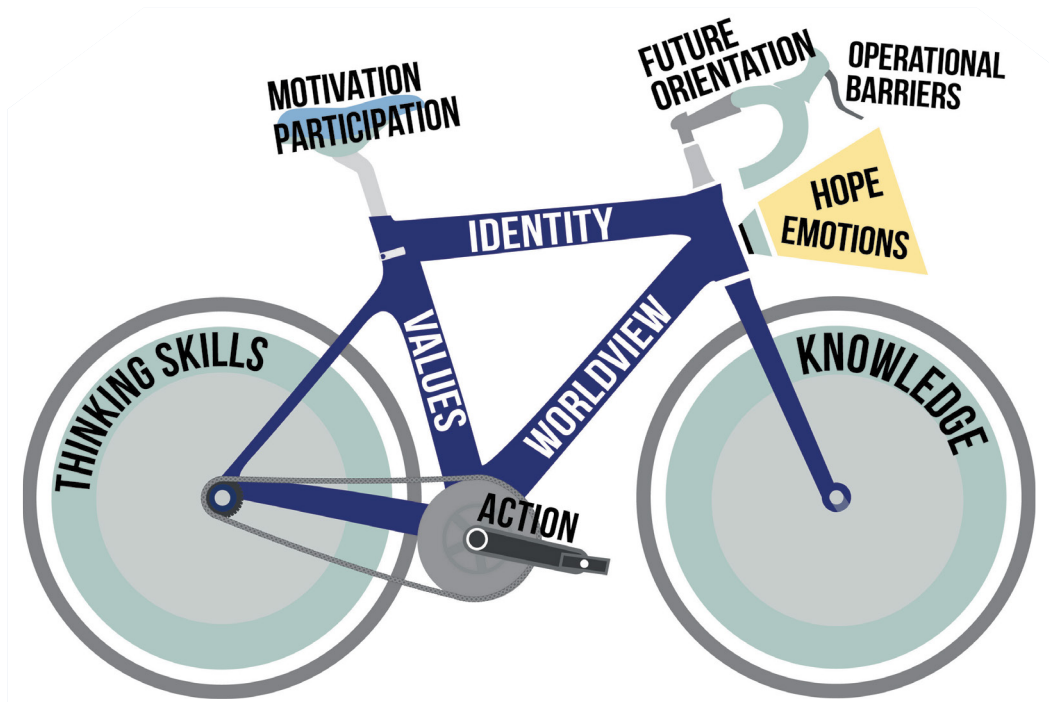
TABLE 2 NAAEE Guidelines for Excellence (NAAEE, forthcoming)

Key characteristic	Practices
1. Collaborative, welcoming, and responsive learning environments	<ul style="list-style-type: none"> Ensure an inclusive learning environment. Engage learners in open inquiry. Explore worldviews and perspectives. Examine climate change information and misinformation.
2. Knowledge and skills to foster climate action	<ul style="list-style-type: none"> Build awareness and appreciation. Understand climate processes and systems. Understand human systems related to climate change. Apply systems thinking. Develop action strategies and skills. Build personal and civic responsibility.
3. Climate emotions	<ul style="list-style-type: none"> Recognise and acknowledge climate emotions. Cultivate constructive hope. Develop self-efficacy and agency.
4. Locally-focused and community-driven	<ul style="list-style-type: none"> Know the community. Identify key individuals, organizations, and communities of interest. Build partnerships and collaborative relationships. Collect community questions and concerns about climate issues.
5. Civic engagement for climate action	<ul style="list-style-type: none"> Investigate community-centred climate concerns. Select a civic action goal and plan a strategy for achieving it. Take action on selected climate issue(s) and concern(s). Celebrate and share progress toward a thriving community.

The Bicycle Model

The Bicycle Model, developed by Finnish researchers, chooses the metaphor of a bicycle, “because climate change education, like a bicycle, is one entity that requires all of its parts to function together” and “needs a user to be in constant motion” (Cantell et al., 2019, p. 718).³⁶ The aspects of climate education corresponding to each part of the bicycle are outlined in Table 3 below. Many aspects are similar to the characteristics and practices in the NAEEE model, although there is less obvious emphasis on collective and place-connected action, perhaps because bicycle metaphor connotes the idea of individual learners/riders.

FIGURE 3 The Bicycle Model (Cantell et al., 2019, reproduced with permission)



³⁶ The bicycle was chosen “because climate change education, like a bicycle, is one entity that requires all of its parts to function together” and “is not meant to stay still, but rather, needs a user to be in constant motion”. (Cantell et al., 2019, p. 718).

TABLE 3 Elements of the Bicycle Model, after Cantell et al., 2019³⁷

Saddle: Motivation and participation

The saddle represents a person hopping on a bike. For climate change education to be motivating, it cannot present climate change as a distant problem or make it difficult to understand. Learners must be able to see that there are many ways to slow down climate change and to participate both as individuals and as communities/collectives.

Bike frame: Values, identity, and worldview

The learner's identity, values and worldview are an integral part of their learning about climate change – learning about one's own identity, values and worldview, and those held by others. Learners can also learn to see how values, worldviews, and identity commitments shape “dominant” norms and behaviours that are so embedded in existing social and economic practice that they can be “invisible” or go unquestioned.

Handlebars: Future orientation

Envisioning the future is a key component of climate change education. Education should provide ways to look at the future critically, but in a positive light. Creativity and the arts may be useful in supporting futures-thinking. Students should practise decision-making, even in situations where one cannot be totally confident that the decision is right.

Front light: Hope and other emotions

Climate change discussion makes many people experience negative emotions, such as concern, fear, sadness, guilt, anger and hopelessness. These emotions must be recognised because they affect learning. Instead of negativity, climate change education should spark hope and compassion. This can be achieved through positive actions.

Wheels: Knowledge and thinking skills

Climate change education often focuses on knowledge. However, gathering knowledge should not be an end in itself. Rather, knowledge should be used critically and to build new understanding through comparison and analysis. Multidisciplinary knowledge and thinking skills are necessary, but they should only form one part of climate change education.

Chains and pedals: Action to curb climate change

In the context of climate change education, action means ways to act in everyday life. Even young learners can participate in action to mitigate climate change when they are provided with support and age-appropriate opportunities.

Brakes: Operational barriers

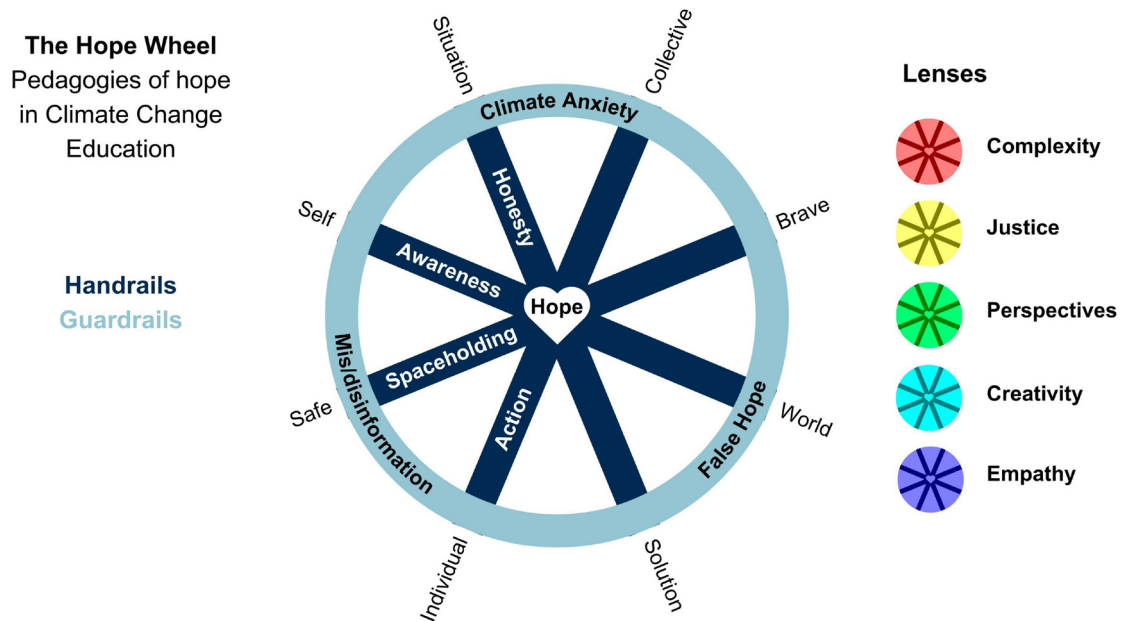
To promote environmentally responsible behaviour, it is crucial to understand what is hampering action and stopping people from acting. These obstacles are often human—such as desire for comfort—but there are also plenty of structural obstacles. When the obstacles are recognised, they are also easier to overcome.

The Hope Wheel

Recognising that teachers may have limited development opportunities (and time) to confidently teach multidisciplinary climate education, the Hope Wheel framework (Finnegan & Abreau, 2024) synthesises research to provide practical guidance for implementing hope-based climate education pedagogies. The Hope Wheel presents three foundational elements: four “handrails” that educators can hold on to while engaging with climate education, three “guardrails” for educators to be sensitive to when implementing the handrails, and five “lenses” through which to explore complex connections between societal and planetary challenges.

³⁷ For a poster by the authors of the Bicycle model, see https://www.researchgate.net/publication/335841323_BICYCLE_MODEL_ON_CLIMATE_CHANGE_EDUCATION

FIGURE 4 The Hope Wheel (Finnegan & D’Abreau, 2024)



The four handrails are Honesty, Awareness, Spaceholding, and Action. Arranged like spokes on a wagon wheel allows each handrail to be shown as a continuum. For example, the handrail of Honesty indicates the importance of providing truthful and accurate information about climate change. The continuum for Honesty highlights the need to ensure learners develop “situation” knowledge as well as “solutions” knowledge. The Awareness handrail highlights the importance of self-reflection and critical reflection on the interconnections of things. The continuum for Awareness indicates that this should include a focus that spans from self-awareness, through to awareness of wider interconnectedness of the more-than-human world. The Action handrail spans a continuum from personal to collective systems-level action.

The three guardrails are Climate Anxiety, Mis/disinformation, and False Hope. These guardrails help by “raising awareness of both what to acknowledge and what to avoid in the classroom” (Finnegan & Abreau, 2024, p. 4). The Climate Anxiety guardrail provides guidance for teachers in ensuring learners’ wellbeing is always supported. The Mis/disinformation guardrail highlights the importance of learners developing capabilities to identify false or misleading information and to “critically evaluate underlying biases and identify robust, reliable, and trustworthy sources”. The False Hope guardrail is perhaps the most nuanced guardrail. This guardrail “supports the honesty handrail by ensuring that solutions and responses are not overly optimistic, simplified, or unrealistic” (p. 4). It also “invites critique of doomist and techno-fix narratives”—which may be disempowering or disingenuous. Educators are also advised to “[avoid] the pitfall of ... laying the burden of responsibility on individual learners”.

The authors elaborate on what each of the 12 elements (handrails, guardrails, and lenses) can look like in practice. Table 4 provides a brief excerpt, showing just three of these elements explained in terms of pedagogical approaches and potential resources a teacher might use or develop with learners.

TABLE 4 Selected elements of the Hope Wheel applied in practice (Excerpt from Finnegan & d’Abreau, 2024)

Element	Pedagogical approaches	Development areas and resources
Complexity	<p>Are complexity, ambiguity, uncertainty and “no silver bullet” framings acknowledged?</p> <p>Is a holistic, systems thinking perspective enabled, looking at the interconnected issues in CCE?</p> <p>Is a bird’s eye view invited?</p>	Develop systems thinking skills.
Climate Anxiety (avoiding harm)	<p>Sensitivity to learner welfare. Do any students come from frontline communities in terms of climate impacts?</p> <p>Have safeguarding ground rules been established?</p> <p>Are all emotional responses validated and supported?</p>	Develop ground rules for creating safe spaces while engaging with complex issues.
Justice	<p>Are historical elements explored? “How did we get here?”</p> <p>Are the disproportionate, unjust impacts of climate change explained?</p> <p>Are the causes, impacts, and proposed solutions for climate change critiqued from a social justice vantage point?</p> <p>Whose voices have not been heard or are disadvantaged? Why?</p>	Support learners to revisit assumptions, worldviews and power relations especially through exploring the experiences of climate change by frontline communities.
Creativity	<p>Can students envision probable, possible, and preferable future scenarios?</p> <p>Enabling “What if ...?” thinking opportunities and exploring creative solutions.</p> <p>Is creativity validated as part of the change process?</p> <p>Is the process of creating visions for the future, particularly positive, collective visions, encouraged?</p>	Digital storytelling projects and curating examples of creative solutions to climate change.

NZCER Briefing—Climate change: What can schools do?

Amongst local offerings, NZCER’s short briefing document *Climate change: What can schools do?* provides some direction on what a whole-school response to climate change might involve. This framing draws on insights from New Zealand research and practice insights, and international literature on climate-responsive education. The focus is what might be seen happening across a whole school. Recognising that schools are part of wider networks, this briefing also draws attention to the potential for broader local and networked engagement, collaboration, and knowledge-sharing (e.g., between schools), and the leadership roles that schools can play in encouraging the lateral spread of practices within these networks.

The briefing suggests actions in nine categories: build knowledge about climate change, look at school operations, know your place, focus on positive action, design climate-conscious curriculum, empower young people, engage your Board of Trustees and community, strengthen local partnerships, and be visible.³⁸

38 The briefing can be accessed at <https://www.nzcer.org.nz/research/publications/climate-change-what-can-schools-do-research-briefing-1>

FIGURE 5 NZCER briefing: Climate change: What can schools do?



Ministry of Education infographic (2023)

A final interesting contribution to consider is a Ministry of Education infographic, released in 2023.³⁹ While not necessarily a research-based framework, this infographic presents messages about local-level learning and teaching practices that resonate with the environmental and climate education research literature. One example is the idea that “ākonga consider the relationship between people and te taiao and the challenge of competing ideas about the control, use, protection, and regeneration of natural resources”. The Ministry has also produced various resources to support climate and sustainability educational practice, including for early childhood.⁴⁰

Whereas the previous research-based frameworks are predominantly addressed to educators and school leaders, the Ministry infographic adds an additional layer, indicating various *system* actions and levers applicable at the level of the whole schooling (and post-schooling) education network system. These include actions towards achieving emissions reductions, supporting climate adaptation, and building knowledge and skills for a low-emissions future in Aotearoa New Zealand.

In this way the Ministry infographic resonates with various international literatures on climate-responsive education systems and policy settings. The systems-level focal points in the infographic reflect some of the wider regulatory and legislative contexts for climate-responsive policy and action

³⁹ See <https://assets.education.govt.nz/public/Documents/Ministry/Initiatives/Ecosystem-infographic.pdf>

⁴⁰ See <https://tewhariki.tahurangi.education.govt.nz/te-whariki-online/education-for-a-climate-changing-future/5637166344.p>

in New Zealand; for example, the Carbon Neutral Government Programme which directs Ministries to measure and set sector-wide plans for emissions reduction, and the National Adaptation Plan which signals the importance of assessing and managing climate-related risks to social infrastructure, such as schools, hospitals, and other public assets. Other key system-level aspects of climate-responsive education that are not included in the Ministry infographic include teacher education, professional development, and school leadership and governance.

FIGURE 6 Tō tatou taiao | Our environment (Ministry of Education infographic)

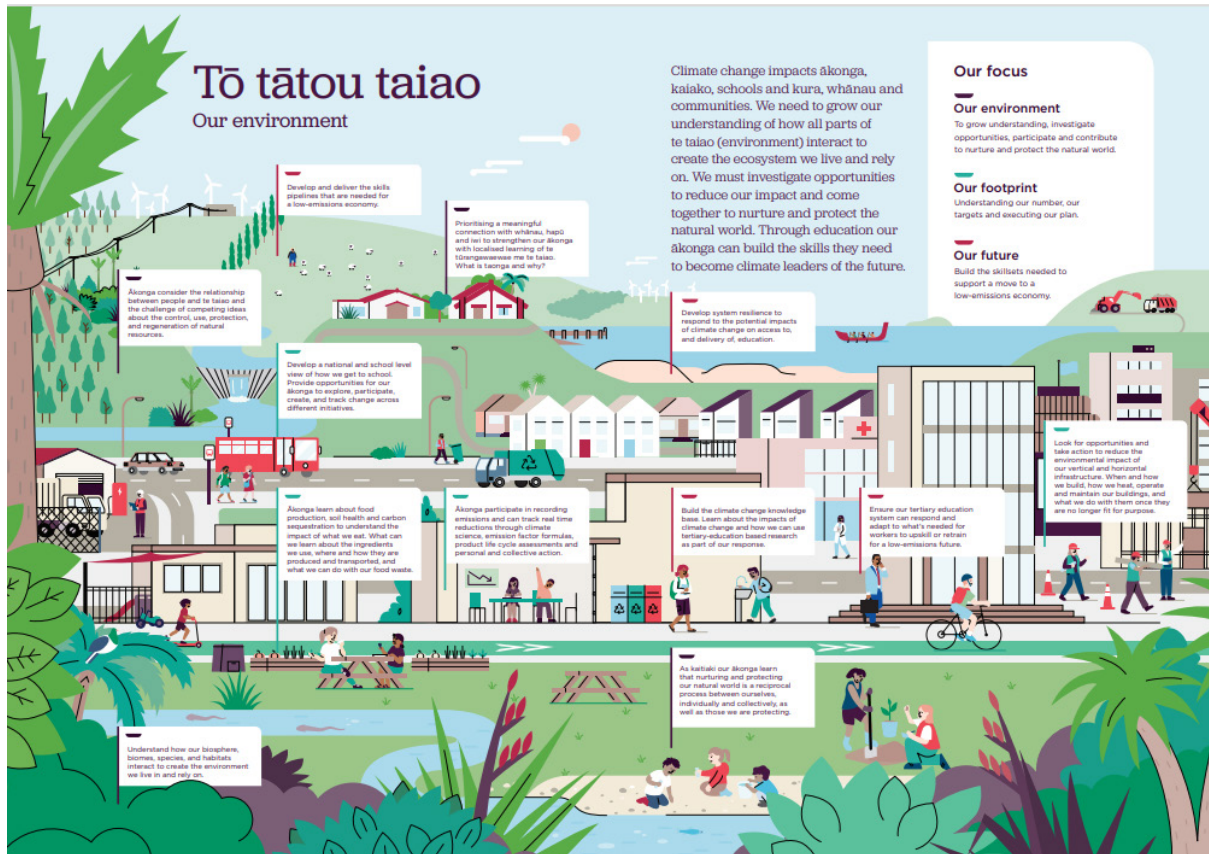


TABLE 5 Key text from Tō tatou taiao | Our environment (Ministry of Education infographic)

<p>Our environment To grow understanding, investigate opportunities, participate and contribute to nurture and protect the natural world.</p>	<ul style="list-style-type: none"> • Ākonga consider the relationship between people and te taiao and the challenge of competing ideas about the control, use, protection, and regeneration of natural resources. • Prioritising a meaningful connection with whānau, hāpū, and iwi to strengthen our ākonga with localised learning of te tūrangawaewae me te taiao. What is taonga and why? • Understand how our biosphere, biomes, species, and habitats interact to create the environment we live in and rely on. • As kaitiaki our ākonga learn that nurturing and protecting our natural world is a reciprocal process between ourselves, individually and collectively, as well as those we are protecting.
<p>Our footprint Understanding our number, our targets, and executing our plan.</p>	<ul style="list-style-type: none"> • Develop a national and school level view of how we get to school. Provide opportunities for our ākonga to explore, participate, create, and track change across different initiatives. • Ākonga learn about food production, soil health, and carbon sequestration to understand the impact of what we eat. What can we learn about the ingredients we use, where and how they are produced and transported, and what we can do with our food waste. • Ākonga participate in recording emissions and can track real time reductions through climate science, emission factor formulas, product lifecycle assessments, and personal and collective action. • Look for opportunities and take action to reduce the environmental impact of our vertical and horizontal infrastructure. [This involves considering] when and how we build, how we heat, operate and maintain or buildings, and what we do with them once they are no longer fit for purpose.
<p>Our future Building the skillsets needed to support a move to a low-emissions economy.</p>	<ul style="list-style-type: none"> • Develop and deliver the skills pipelines that are needed for a low emissions economy. • Develop system resilience to respond to the potential impacts of climate change on access to, and delivery of, education. • Build the climate change knowledge base. Learn about the impacts of climate change and how we can use tertiary-education based research as part of our responses. • Ensure our tertiary education system can respond and adapt to what’s needed for workers to upskill or retrain for a low-emissions future.

Summary

The research literatures indicate that effective climate education provides learners with holistic, multifaceted learning opportunities that are rich in knowledge and knowledge-building experiences. These learning experiences help to develop learners’ sense of place-awareness and place-connectedness, as well as building understanding of the social, economic, cultural, and historical contexts that shape current climate and environmental realities. Effective climate education also draws on a range of disciplines and knowledge systems. In addition to developing knowledge, effective climate education builds learners’ capacity to understand and think about systems, and the interactions between systems, and to reflect on values and worldviews (their own, other people’s, those underpinning the systems around them) in relation to the more-than-human world. Effective

climate education supports the development of learners' critical, ethical, and creative thinking abilities, and capabilities to plan, carry out, and reflect on various forms of action as part of their learning. Climate education also involves multiple forms of connection with the environment and wider community. While there are frameworks that provide guidance about what teachers can do, the enabling or constraining features of wider school norms and system-wide settings are recognised as a key factor in shaping the space within which climate education practice can flourish (McKenzie, 2022; UNESCO & MECCE, 2024).

Sections 3 to 7 present six case studies of climate and sustainability education practise, foregrounding the experiences and insights of learners and teachers in different contexts. In each case study we highlight themes that connect with the literature discussed in this section.

Section 8 draws together the views of participants across the case studies, to offer their perspectives on what "flourishing" climate education would look like.

Finally, Section 9 discusses themes that emerged across the case studies.

3. Te Ahi Kaa at Taita College

We are tangata whenua, we need to be on the land. (Kaiako)

Te Ahi Kaa is the name of a whānau based class at Taita College, which we studied in 2022.⁴¹ The naming is significant and speaks to the purpose and activities of the class.

Ahi kaa refers to both home fires and those who keep them alive. Literally, ‘ahi’ means ‘fire’ and ‘kaa’ means ‘to burn’, and ahi kaa keep places warm through human presence. (Taiapa et al., 2021, p. 149)

The class included both juniors (from Year 10) and seniors who worked together for one day a week outside out of the classroom. Through hands-on, practical, and authentic experiences, ākonga were physically working to restore the environment around the school. The approach and activities of Te Ahi Kaa resonate strongly with kaupapa Māori education and climate change literatures, and other Indigenous literature on land-based education (see Section 2).

The need to care for the land

The school’s property extends far beyond the school playing field and up into steep hills and valleys cloaked in native forest. An awa known as Waiwhetū Stream springs forth from these hills. An above-ground segment of this waterway runs across the back edge of the school field, feeding into waters that flow southwards, joining Te Awakairangi/Hutt River near its mouth, about 9km. The stream has a rich history.

The [Waiwhetū] stream network sustained iwi for centuries before the arrival of European settlers, with Owihiti Pā and Waiwhetu Pā being the most important Pā on the awa ... It is also recorded as Ngā Taonga Nui a Kīwa, a water body of most importance to Mana Whenua, in the Natural Resources Plan for the Wellington Region.⁴²

With colonial settlement, development, and industrialisation, sections of the stream were changed significantly.⁴³ “Once crowned with the dubious honour of being the most toxic stream in New Zealand”, the lower reaches of the stream were “used as an industrial drain for decades”.

In 2006, its metre-deep layer of sludge contained DDT and *E. coli* and had levels of copper, zinc, and lead that exceeded environmental guidelines by as much as 90 times.⁴⁴

While the lower reaches of the Waiwhetū Stream remain “heavily channelised and polluted”,⁴⁵ the upper and middle range including the part near the school “still retains āhua (natural character)” (Whaitua Te Whanganui-a-Tara Committee, 2021, p. 71).

41 We visited the school several times during the year to observe what they were doing, and interviewed the kaiako and nine students in two groups in term 4, 2022.

42 <https://www.wellingtonwater.co.nz/resources/topic/wastewater/monitoring-and-testing/waiwhetu-catchment-sampling/>

43 According to Wellington Water, this included sections being straightened, culverted into concrete channels, having surrounding vegetation cleared, and other “pressures of urbanisation”.

44 <https://environment.govt.nz/publications/our-freshwater-2020/issue-2-water-is-polluted-in-urban-farming-and-forestry-areas/>

45 A 2021 assessment graded the stream as “Wai Kino, contaminated by human waste”.

Next to the school is the former site of the DSIR Soil Bureau (1955–1980), and the hills behind this site are cloaked in exotic trees including pine.⁴⁶ The DSIR Soil Bureau was disestablished in the 1980s, and the site has since been inhabited by The Learning Connection, an arts-based tertiary institution.

Over several years Te Ahi Kaa have worked on the land, clearing blackberry, uncovering and restoring wetland areas, naming the land, and getting to know what lives there. The learning is taught through a te ao Māori lens, with the aim of giving students an understanding of what it means to be tangata whenua (people of/belonging to the land), and the obligations that come with this.

The origins of Te Ahi Kaa

Matua Haimana (Simon) established Te Ahi Kaa in 2019, with support from school leadership.

I literally looked out the window and realised, that's where we need to be. We are tangata whenua, we need to be on the land. We need to be teaching outside, on the land. (Matua Haimana, Kaiako)

Karen, the then-principal of the school, believed that culturally-responsive and transformational leadership was about “creating the space for things to happen”, and “being creative with what's right for your people and your place”.

Not feeling bound by the conventional curriculum. It's about having the courage to step outside that, and say it's ok, we're going to do things differently because that's what we need to do here, and that's the direction that we want to take. (Principal)

Prior to the establishment of Te Ahi Kaa, Matua Haimana took a year off teaching to study at Te Wānanga o Raukawa. He studied a Māori environmental revitalisation diploma and a Rongoā diploma. The idea of Te Ahi Kaa grew from there.

I realised we need to revitalise the environment so that we can grow rongoā. I wanted to do more than what we [teachers] were being asked to do in the teaching profession and [I wanted to] make it [the learning] more real for our kids. (Haimana)

In the 3 years that Te Ahi Kaa had been running, he and the students, with some help from others in the community, had achieved much within the whenua and taiao at the College.

We didn't know what we would be able to accomplish in the beginning and then we managed to transform the backyard of the school. (Haimana)

Aspirations for ākongā, whenua, and taiao

Haimana said his hope was that ākongā would gain a connection with the land through their time in Te Ahi Kaa. He expressed his desire for all students to become tangata whenua, regardless of their ethnic background.

I want the kids to have a connection with the land and to be tangata whenua. For non-Māori, I want them to understand that whilst they are tangata whenua, they are not tangata whenua to this particular land (in Aotearoa).

Recognising that knowledge is place-specific, and that different hapū and iwi have their own particular knowledge or practices, he hoped that what students learned through Te Ahi Kaa would give them a base to seek further knowledge from their own people or places. He also wanted his

⁴⁶ The contrast between the adjacent native and exotic forests was part of what led N. H. Taylor, Director of Soil Bureau, 1952 to 1962, to lobby for siting the Bureau in this location. With one catchment under native forest, one under exotic forest and one in “improved pasture”, Taylor had a “grand plan ... to use three catchments as giant lysimeters to study runoff and soil weathering processes” (Simmonds et al., 1980, p. 22).

students to develop a sense of agency in terms of taking care of the environment. He used the Māori board game, Mū tōrere,⁴⁷ to describe important life lessons in terms of making choices that provide more opportunities.

I want ākonga to take control of their own world and be able to affect change and allow themselves to have choice. Mū tōrere—a Māori game—once you're out you have no more choices—there's a life lesson in there. Always move to make choices which opens your choices. (Haimana)

Haimana expressed his hopes for the whenua that it “starts to blossom, reflect healthy growth, [and that there are] more signs of wellbeing on the land”.

Connections and relationships

Haimana emphasised the importance of connections and relationships. He wanted to continue to build connections with tohunga Māori who are experts within their field, to extend students' access to Māori knowledge, tikanga, and ways of understanding and doing things in the natural world.

Whether it be carving, weaving, rongoā, [the learners need] to be able to have access to these types of tohunga (experts) who have this knowledge. (Haimana)

Haimana acknowledged that he was still on a learning journey and was keen to continue to develop learning relationships with other people who work in the natural world to bring their value to Te Ahi Kaa. He gave as examples—those who have great understanding of the maramataka, Māori astronomy, food sovereignty, and many other areas of expertise.

I want to be working alongside other Māori. Making connections is really important to me ... It's a wānanga with other people about the land. (Haimana)

For his teaching colleagues, he hoped the activities of Te Ahi Kaa helped them to see the school as a home, and to create an affinity to the whenua.

If we can inspire them here, it might encourage them to go back to their sections of their houses and make those small subtle changes. I want them to work more on the land and to take this learning back to their own home, you know, how can I inspire them to care about the whenua? (Haimana).

Students' views on Te Ahi Kaa

Students described Te Ahi Kaa as a class for those who enjoy being outdoors, physical work, learning directly with te taiao and the whenua, and learning through a te ao Māori and mātauranga Māori lens.

Yeah, you've got to understand how to work. You've got to be used to the weather—'cause one day it might be fine as, the next it could be cold or rainy. If it's bad, we go into class and do bookwork but if it's just spitting then we still go out. (Te Ahi Kaa, Year 11 student).

Students said they liked being outdoors, seeing the impact of their mahi, the physical aspect of their work, and the extra learning opportunities available.

[I like] the outside work, how we can help make a change to the nature and all that stuff. (Te Ahi Kaa, Year 11 student)

Yeah, a lot of blood and sweat—it really shows how hard you've been working. (Te Ahi Kaa, Year 11 student)

⁴⁷ A Māori board game. <https://www.whatdowedoallday.com/mu-torere/>

However, some suggested Te Ahi Kaa is not necessarily for everyone, noting that people's family and whānau backgrounds, as well as personal characteristics, might influence how much affinity they feel to the land, and being outside working with it. Students also valued the extra learning opportunities and experiences they had through Te Ahi Kaa, for example trips and a noho.

We had a noho and we caught some eels and one freshwater crayfish. That's what we have in our creek out there. (Te Ahi Kaa, Year 10 student)

Learning how to clear invasive species and seeing the impacts

Students talked about the mahi they had done to clear out the blackberry bushes at the back of the school, learning how to safely use a variety of tools. This was a huge achievement, with tangible positive results.

The swamp and that [area] was just a blackberry bush before we came and did this work. And we made it better and better over time. The blackberry was stopping other plants from growing, it was taking up the space and soil, and the eels didn't like it. (Te Ahi Kaa, Year 11 student)

Once the blackberry was cleared from the wetland, students planted harakeke that they harvested themselves from established flax bushes from other areas of the school. Students could see how this work had helped to improve water quality.

The water is now clearer since we planted it [the harakeke]. (Te Ahi Kaa, Year 10 student).

As a result of their work, students were seeing more native plants thriving and the return of native birds, eels, and other types of fish.

We found a big kōkopu! (Te Ahi Kaa, Year 10 student).

The eels and that will come down and stay in the swamp, more often now as it's not filled with blackberry bushes. And with the birds too, they just come over and visit then they leave again. (Te Ahi Kaa, Year 11 student).

Learning about properties of plants and native trees

Some students talked about how Te Ahi Kaa provides an opportunity to learn about the properties and history of plants and trees, how they can be eaten or used for medicinal purposes, and "how different plants give life to other stuff".

We learn about plants and how to identify them properly ... And what ones we can eat, (Te Ahi Kaa, Year 10 student)

We learnt that Kahikatea, Kawakawa, and Mānuka [were rākau that] our ancestors used for medicines and for tea, rather than going to the pharmacy. So, we learn that we can make stuff out of them. (Te Ahi Kaa, Year 11 student)

Learning how to plant and grow

Students described what they had learned about growing plants; for example, how to plant harakeke, and why this plant is important for wetlands.

We just dig a hole, put it [the harakeke] in, and make sure the tummy is facing to the North-East. So, you have to face the rounded part at the bottom, which is called the puku, to the North-East. This helps them to grow faster. (Te Ahi Kaa, Year 11 student)

When planting harakeke you cut it on the angle, so it [water] doesn't go under the roots. (Te Ahi Kaa, Year 11 student)

Some students talked about learning to create a māra kai so that they can grow food in their own backyards.

[We learnt] how to make sure that plants will grow properly in a māra kai and that they should be separated and organised, so you know what is what. (Te Ahi Kaa, Year 11 student)

The māra kai was one area where Te Ahi Kaa had support, knowledge, expertise, and time from collaborators from outside the school, the “Cuzzies i te māra” (see box)

“Cuzzies i te māra”

The māra kai being planted next to one of the classroom blocks was supported by two young adults from the community—Lani and Tina—with whanaunga connections to Haimana. With backgrounds in Māori-led community development, māra kai, waste minimisation, and reo Māori revitalisation, they had given themselves the “unofficial title” of “Cuzzies i te māra” (Cuzzies in the māra) which “helped us to establish our view of how we exist within [the] college”.

Seeing ourselves as supporters and providers of services and facilitators of their dreams. Matua has a strong dream of growing rongoā around the school so that whānau have access to rongoā and healing themselves. So we are helping him facilitate his dream and our dreams of everyone being able to grow kai. (Lani and Tina)

Lani and Tina saw the work as justice-oriented climate action.

I like that term [climate justice], because the cause of the problem is interconnected with the state of indigenous wellbeing. We know that the antidote to a patriarchal capitalist extractionist system and economy is ohaoha [to be generous, bighearted, kind] and meeting our everyday needs locally like our tūpuna did, and to value that. The flow on effects of that bring climate action e.g. cutting emissions on food travel and all of that. (Lani)

100%. Healing Papatūānuku, it's climate action and also it's restoring our natural relationship with taiao and our natural responsibilities to te taiao which is our whānau—which is all deeply spiritual and political. (Tina)

Noting that many of the rangatahi at the school had whakapapa links to other regions, the māra was described as “a very urban Māori expression of relating to whenua from a place that is not our tūrangawaewae” and “a space we could connect on our whakapapa”.

... the māra became a place for connection because there's not many places, unless you have access to whānau with that knowledge, to normalise talking about whakapapa and also talking about constitutional transformation and Matike mai⁴⁸ and colonisation. (Tina)

We have karakia, we waiata, we have conversations about our deities and different attributes, we end up having conversations about our mental health in the māra (Lani)

The pair noted numerous challenges for doing this type of mahi within conventional English-medium school structures—including the rhythms of seasonality, noting that summer (when schools are closed) is when māra may be most abundant, and winter, when many students are in some of their busiest study times, are times when there is a craving for rest for mind and body.

48 <https://matikemai.maori.nz/matike-mai-aotearoa/>

Trying to live by the maramataka, the moon and the taiao is really tricky in the 9-5! So if I could see a transformed school system it would be a long holiday during Matariki and getting into it in summer! (Lani and Tina)

For themselves, being able to sustain their (largely unpaid) work with students was a challenge too.

The mahi we are doing—connection to whenua, time with whenua—needs to be prioritised because that is how we instil the skills for our future.

The approach and experiences of Cuzzies i te māra resonates with a growing body of literature on māra kai and community gardens as sites of learning, restoration, decolonisation, cross-cultural exchange, and community climate resilience (e.g., Hond et al., 2019; Taiapa et al., 2021). Māori literature also discusses how Western-centric approaches to time have become embedded in structures and institutions (such as schooling), marginalising Māori temporal understandings of time as continuous, dynamic, cyclical, relational, bound to place and people, and whakapapa-based (King et al., 2022).

Learning through a te ao Māori perspective

Students' comments suggested they had a sense of what it means to be tangata whenua or people of the land regardless of whether they identified as Māori or non-Māori. They recognised Māori deities such as Papatūānuku, Ranginui, and other atua Māori, and were able to view the work they do in Te Ahi Kaa through te ao Māori (a Māori worldview).

Papatūānuku is the earth, mother nature, and that's how the plants are bred. (Te Ahi Kaa, Year 11 student)

Some students demonstrated an emotional connection and commitment to the whakataukī, “ko au te whenua, ko te whenua ko au—I am the land, and the land is me”. These students expressed the importance of taking care of Papatūānuku, and that everyone needs to take responsibility to improve the health of the environment.

'Cause [if there is] no Papatūānuku, [then there is] no us. It's simple. If Papatūānuku goes, then so do we. There will be no more land to grow food or stuff like that. (Te Ahi Kaa, Year 11 student)

The ongoing impacts of Te Ahi Kaa

We asked students if they would take some of the learning from Te Ahi Kaa with them once they left school. They felt they would.

Yeah, I reckon if people stay in this class long enough, they'll understand why it's [Papatūānuku] important and when they leave, they'll properly change their mind and their actions of what they do. When you see it [the transformation] happen, when you see what you've done, you know you've made a change in something, it makes you want to keep doing it. (Te Ahi Kaa, Year 11 student)

Haimana expressed the hope that students developed an affinity with the land through being in the class.

They [students] will know to look at plants differently now—is this an exotic? Is this indigenous? What's its name if it's indigenous? Where does it grow best? What was it used for?—it's unlocked potential waiting to happen. It's energising and inspiring. (Haimana)

Matua Haimana felt the work was “invigorating”, and had aspirations for where things could develop next. For example, developing a seedling nursery, planting a rongoā garden for the community, and being able to harvest and use harakeke ākongā had planted.

Knowing that in a couple of years we will probably be able to do rāranga and we will have a sustainable rāranga pā harakeke there, and having the ability to do rāranga for kete or rāranga for muka (textiles). We have that luxury here and these kids will know because they dug out the blackberry, they planted the harakeke and they even split them from the harakeke that was already there. (Haimana)

Discussion

Te Ahi Kaa, as a case study, reflects a Māori way of thinking about learning and actions that support hauora and “flourishing” for people and the taiao. Though climate change was not always directly in focus, Te Ahi Kaa strongly resonates with kaupapa Māori literatures, and other Indigenous “land-based” climate and environmental education literatures discussed in Section 2. There was a strong emphasis on nurturing relationships and whakapapa connections. Decolonising and justice-oriented framings were also evident in conversations that ākongā could have with the “cuzzies i te māra”. One aspect we found interesting was how this approach was accommodated within an English-medium school, creating time and space for ākongā to be on the whenua, develop deeper connections, and working to improve the wellbeing of the whenua and taiao. We will return to this theme of creating time and space for deeper environmental and climate learning in the final sections of the report.

4. Climate justice in Year 10 social studies

Social action is a major part of the social studies curriculum, [but] it's hard to make this fit within the traditional system (Teacher)

This case study focuses on a climate justice unit in Year 10 social studies class, taught in Term 2, 2022. Michael, the HOD social studies and a history teacher, was a colleague of Haimana at Taita College. Michael was interested in the interconnectedness of environment, history, and social action, and the two teachers often had deep and wide-ranging conversations about these topics.

As discussed in Section 2, climate justice is a relatively more recent theme to emerge in the climate education literature, and there is relatively less research into this aspect of climate education in school contexts, compared youth-led and community-based climate action groups,

where self-directed and social learning is taking place, and from which public awareness of, and political pressure for climate justice often emanates (Trott et al., 2023, pp. 6–7).

This case study illustrates one teacher's exploratory approach to teaching climate justice through a social inquiry approach. Several themes from the literature were reflected in this case study. For example, the importance of building contextual knowledge about climate change and its interconnections with social and economic systems, the challenge to ensure learning feels relevant and engaging for students, and constraints of time in allowing for breadth and depth of learning and opportunities for taking action.

How the unit was designed

The unit was designed around a social inquiry question: "How should we respond to the unfairness of the climate crisis?". Focus questions within the inquiry included:

- Why is the world getting hotter and what are the impacts of this climate change?
- How does climate change impact different communities inequitably?
- What do people think we should do about climate change and its inequities?

Over the term, students watched videos, read articles and books,⁴⁹ and had class discussions to build their knowledge about climate change and how different people and groups were affected. The teacher explored different ways to get students to express their understandings; for example, working in small groups to construct Play-Doh models of their interpretation of climate justice, and explaining their construction to other groups. Towards the end of the term, some students attended a School Strike for Climate (SS4C) event at Parliament in Wellington.

At the end of the unit we interviewed Michael. Four students volunteered to be interviewed as a group about their experiences, joined by a fifth student who was part of Te Ahi Kaa (case 1). We asked students they had learned about climate change and climate justice, who they saw as more impacted

⁴⁹ For example, Climate Emergency Atlas by Dan Hooke <https://www.dk.com/us/book/9780744021837-climate-emergency-atlas/>

by climate injustice, and why. We also asked how they thought these ideas applied to local contexts, for example how climate change did or might impact people in Taitā, Lower Hutt, and other areas of Aotearoa New Zealand.

Building understanding about climate change and climate justice

By the end of the unit, Michael felt that the students had developed a greater understanding of climate change, and were able to identify some of the causes. Students described how they were asked to each choose and research a specific place, or group of people that were experiencing climate injustice; for example, people in other countries, and Indigenous people.

It was generally more poor countries with less resources than ours. In the [text]book there was a page with chimneys and stuff that showed how much each major country has contributed to greenhouse gases ...

Students said they had developed in understanding that climate injustice means “a certain group of people will suffer more than others”. Conversely, they understood that climate justice is about developing solutions that promote equity to those most vulnerable to the effects of climate change.

It's a solution to help with climate change that everybody helps with equally. (Student)

There's more climate injustice than justice. It's when climate change affects some specific groups more than others. And usually, it's those that have contributed the least. (Student)

Seeing the contrasts between countries and groups, one student thought that

... maybe there aren't many people here we could say we are [heavily impacted]. But when you compare to countries that are having more of a climate change crisis, you see how much they are really suffering. And, not everyone can have the same luxury as we do. (Student)

The students could also see how climate change might differently affect people in their local communities, and that “peoples' lives will get harder due to climate change” if more action wasn't taken.

Yeah, I mean you can see it's been getting hotter and more intense rains when it's a lot hotter. So, people like the homeless, let's say, are experiencing it more. (Student)

There's the big river. With sea level rise, rivers rise, you can see it will affect people ... there are many reasons why people in Taitā can be affected. (Student)

At some point it might be one [flood] where they might not be able to go back. (Student)

Student engagement

Michael felt that student engagement across the class had varied, and student attendance that term had been very variable due to COVID. He reflected on the challenge of how to fully engage the students.

I've found it's really hard to develop an emotional commitment or connection, or sense of urgency in this topic. (Michael)

Michael felt that the class had spent most of the time looking at the causes of climate change and developing conceptual understandings about climate change and climate justice, but relatively less time was spent on learning how to take social action. As a teacher of history, he was interested in what could be learned from exploring the techniques and tactics of social movements. If teaching

the unit again, he reflected that he might start with a topical protest action early in the course, such as the direct action protest campaign to restore passenger rail (which was happening at the time), to encourage students to think about what was going on.

It opens up right away, 'ok what's the problem?', the actions [the passenger rail protestors] are taking are interesting and there are diverse viewpoints and perspectives. It tells us to disrupt society although society tells us not to. [It's] direct action and wanting to create change within society, how to foreground action and solutions. There is no easy answer. (Michael)

We asked students how they thought schools can improve how they teach about issues like climate justice and climate change. Students talked about using games and other approaches to make learning feel engaging and interesting. Though it did not exist at the time of this case study, the type of game that might have worked well in this unit is NIWA's Township Flood Challenge game.⁵⁰ One student suggested some reflective questions that could help teachers consider what type of environments can best support students' learning.

I think they should pay close attention to the students we have now... I think we should look outside the windows of the school, or a home, [and] see, what does this [place] have that other places don't have? Sometimes they have really nice, healthy looking trees and stuff. When you look at a school sometimes you realise, 'how is this a good environment for my students?' (Student)

Students emphasised the need to make the learning fun, and relevant to people's lives.

[School learning can be] really boring, you're doing a lot of writing and it can feel like a chore or burden, or a job and we're not getting paid. If they [teachers] got the students' minds more active, because people have a lot of fun when we're doing stuff we want to do. If they pointed it more towards that, it definitely makes them [students] want to do more. (Student)

Learning through action

One significant challenge was how to make space for students not only to learn about social action, but also to engage in informed action themselves.

it's hard to make social action fit within the system ... how can social action take a more central role within education? Social action is a major part of the social studies curriculum, [but] it's hard to make this fit within the traditional system. (Michael)

Michael also thought it would be valuable to link the learning with Te Ahi Kaa, guiding students to understand the work happening in Te Ahi Kaa as a direct form of climate action.

So how can we work with Te Ahi Kaa and what they're doing? How can I build my history curriculum around Te Ahi Kaa? ... What is the history here? How have things come to be, and what action have the kids in Te Ahi Kaa done? Using a Māori worldview and climate ... I want the kids to know that here is a solution, right here on our school grounds. How can we transfer this learning back into our homes? (Michael)

When students were asked for ideas on how to embed climate learning and action into the school, they mentioned a climate group that included both students and teachers. Although the group had not met much that year, and only some of the students we interviewed had attended meetings, students said some of the ideas that had been discussed included developing more reliable or renewable energy sources, such as having windmills or solar panels to supply energy to the school, reducing the need for fossil fuels.

50 Launched in early 2024, the game and supporting classroom materials support exploration of climate change, adaptation choices, wellbeing, values, and decision making. See <https://niwa.co.nz/township-flood-challenge-game>

If more of NZ converted to renewable energy resources and other countries as well, it would be a good start ... (Student)

Students expected that the planting and regenerating work that was happening in Te Ahi Kaa would expand over the next few years.

Students being a voice for climate justice

Although they had personally felt engaged, the students we interviewed acknowledged that it had been hard for some of their classmates to feel engaged. The students talked about their potential influence in getting others to care about climate justice and climate change.

If [kids] make themselves heard, they could be influential. I know of a lot of people in our class and other classes as well [who] are really intelligent ... I reckon they could spread the word and get people to contribute to this climate justice. (Student)

It was suggested that visiting other schools and working in collaboration with other student climate change groups could be a way that students could make even more of an impact.

It would be way more productive ... working together to stop what's going on. [We] could share ideas. (Student)

One student commented on the need for wider public discussion of climate justice and the need to take care of different groups of vulnerable people such as the elderly, homeless people, and those in less-developed countries.

I only have one nan. It would be way better to see her and all our grandparents live in a good environment. That we do not have to worry about the air we breathe being bad for them and so on. (Student)

Discussion

Exploration of climate justice and injustice is one way for learners to begin to understand the entangled social, cultural, economic, and biophysical systems that interact in complex ways to produce climate change and its unequally distributed impacts. Frameworks such as the Hope Wheel suggest ways in which complexity and justice-focused dimensions of climate education can be put into practice in the classroom. However, research that explores how climate justice is interpreted and enacted in teaching practice across contexts is still relatively sparse.

This case study suggests that a social inquiry approach can be an effective way to investigate concepts of climate justice, contributing towards one dimension of NAAEE's Guidelines for Excellence (forthcoming), namely "Knowledge and skills to foster climate action". One clear challenge was finding ways to build students' sense of personal connection and engagement, and having time to connect climate justice concepts with locally-relevant contexts. Given sufficient time, the teacher and students saw there could be benefits in students being able to carry out action projects and connect their learning with different climate and environmentally-focused activities happening across the school. Students were also interested in the idea of connecting with students from different schools, to share ideas and work on projects together. Being able to expand into these kinds of learning activities would reflect NAAEE's guidance for climate education to include the aspects of "locally-focused and community-driven" learning, and "civic engagement for climate action".

5. Climate Action Campus, Ōtautahi

It's a place people see as a bit of an innovation hub to try things in terms of climate resilience. (Learning advisor)

The Climate Action Campus (CAC) in Ōtautahi Christchurch is a unique satellite campus that has come into being through a confluence of circumstances—including the red-zoning of lands after the 2011 earthquakes, the vision and drive of a city leader, and support from networks of people and groups who see the potential of this space to support environmental and climate learning and action. We studied the CAC from 2021–2023.⁵¹

Many themes from the climate education literature are evident in the CAC. For example, a strong emphasis on action-based learning as a way to defuse or avoid feelings of disempowerment or anxiety about climate change. Like Te Ahi Kaa, CAC has a strong focus on being outdoors, connecting with nature, growing food, tapping into the knowledge and skills of the wider community, and becoming a resource for community wellbeing and resilience. An openness to innovation and collaboration are also key characteristics, with CAC intended as a place and space for “everyone”, including people from many different schools and the wider community.

The origins of the Climate Action Campus

CAC is located in the Ōtākaro Avon River Corridor, within the Red Zone in Ōtautahi Christchurch. The campus was the brainchild of former Christchurch Mayor Vicki Buck, who had experience working on climate change in business contexts, and was motivated to respond to young people’s concerns about climate change and demands for action.

That sense [young people expressed] of what’s the point of learning or doing anything when we have this threat to our existence. It’s a good question. (Vicki)

The vision was to open a collaborative school with a sole focus on climate action, enabling young people to connect with nature and “to feel they have some control” through taking actions for the climate and the environment.

Part of the campus sits on the former site of Avonside Girls’ High which was decommissioned after the 2011 Christchurch earthquakes. Some of the existing buildings on the site were unsafe and scheduled for demolition, and other buildings were moved away to be used on other school sites. A number of prefab buildings remained on site to provide indoor spaces for various activities, including a large kitchen. Outdoor areas were being transformed with chicken houses, vegetable garden beds, and areas for nature play. The land around the site, once a suburban neighbourhood, is now a large green space dotted with trees, community gardens, and paths for walking and biking.

⁵¹ For this case study, we interviewed six staff from the CAC, four teachers from partner schools that used the campus, and five small groups of learners from four partner schools, ranging from Year 3 to Year 8. The campus was visited twice, in June and September 2023. Most interviews were conducted face-to-face, with a few of the interviews with adults happening via Zoom.

It's called the red zone, but it's really a green zone. It's just amazing in its possibilities. The restoration of the river and the land, the bird life, and what happens when people get out of the way. (Vicki)

Because starting a new school can be very difficult, the idea of a satellite campus school was suggested by the Ministry of Education. Buck approached the then principal of Ao Tawhiti school who agreed to becoming the lead school for the satellite campus.⁵² Ao Tawhiti is a composite school, described further in the next section.

Staffing the campus and building relationships

An ethos of possibility, connection, and innovation threads through the campus and its activities. The leadership role for the campus was initially picked up by Niki, the leader for the primary school within Ao Tawhiti, who described this role as “completely out there” compared to anything she had done before.

What I love about it is the limitless possibilities. (Niki, CAC leader)

When we first encountered CAC in 2021–2022, the campus was still evolving. Many buildings were at various stages of demolition or removal, and there was lots of work to do around the grounds. A caretaker role was established early on to provide support with all the hands-on work that was needed as the site was transitioning, and a horticulturalist to provide support for food gardening. Some of the learning activities already happening around the site included composting, beekeeping, growing kai, developing a native tree nursery, and nature play. The campus was used semi-regularly by students and staff from Ao Tawhiti school. Around nine other schools, mostly in eastern parts of Christchurch, had agreed to be regular campus users. In 2023, additional staffing roles were funded, including one full-time and two part-time learning advisors⁵³. By late 2023, at least 18 schools and learning centres had used the campus during the year, with new inquiries continuing to come in as “word of mouth” spread.

Becoming a hub

Campus staff and teachers from other schools who used the campus talked about the importance of the campus being a “hub” where people and groups could connect, learn, share ideas, and collaborate on emerging opportunities. Part of the vision was to have people of all different ages working on interconnected projects, from “pre-schoolers” to “people in retirement villages”. Another aim was that the campus could serve as a hub for community climate resilience; for example, working with local energy providers to establish solar power onsite, envisaging scenarios in which communities could come to recharge phones or address other needs during emergencies.

It's a place people see as a bit of an innovation hub to try things in terms of climate resilience. (Sian, Learning advisor)

People and groups connecting with the campus included local and regional council, community environmental groups, artists, builders, people from the tertiary sector, and businesses. An openness to collaborative opportunities meant that new ideas were being implemented all the time.⁵⁴ There were rooms available at the campus for community-based climate action groups to convene their meetings and workshops. A food rescue organisation was also based onsite.

⁵² This arrangement meant that Ao Tawhiti would provide a senior leader and the Ministry of Education would provide a grant for campus operations.

⁵³ At Ao Tawhiti, teaching staff are known as learning advisors.

⁵⁴ For example, discussions with the organisers of Biketober, Christchurch's cycling festival, led to the building of a bike track around the campus.

Being right next to the Ōtakaro Avon River lent itself to river-based connections. A few schools connected to the CAC had the opportunity to join a double-hulled waka trip along the river, led by experts from the local marae who shared te ao Māori knowledge and local histories during the journey. Other river-based collaborations included programmes like Te Tuna Tāone⁵⁵ to monitor water quality and take action to improve the life of taonga species.

Several interviewees commented on the importance of Vicki Buck's ongoing support in brokering useful connections and relationships with a wide range of community and business groups. It was observed that the campus was a place that attracted people and groups who were willing to "give their time and resources, or to try things".

You have to be sort of, reasonably dogged I think, persistent. You have to stay at it. This has been 4 years in the making so far ... You have to be prepared to raise money, not be paid yourself, and know how to work around the challenges. (Vicki)

The novelty of having someone with the time, capabilities, and drive to do this was noted by visiting teachers.

Can you imagine if every school had a climate administrator or teacher and their one role was to make those connections in the community and bring people together? That's one solution, could be other ways. (Intermediate teacher)

An "organic" curriculum

As Niki explained, there was no predetermined curriculum for the campus and the idea was that it would be "organic", growing and evolving to meet whatever the participating schools and students wanted to do.

My hope is that it will be buzzing with kids from all different schools doing their project that they're involved with, taking action on climate change through projects they are choosing and [the secondary students] can harvest whatever credits from that ... I am really keen for all of the curriculum areas to be covered—art, music, enterprise, all of that. (Niki)

By 2023, Ao Tawhiti, the parent school, was a regular user of the campus. Several other schools had established regular or semi-regular visits, including some large groups for experiences like beekeeping, and some small groups working on specific projects. When a new school wanted to connect, the typical approach was to invite staff to visit the campus to see what sorts of things they could be doing there. The ways different groups utilised their time on the campus varied according to what each group came wanting to achieve.

In each week I would interact with about 4 different school groups or groups coming through. Sometimes I'll be creating a programme for them in consultation with what it is they are after. Other times they come with their own ideas, and you are just helping them undertake that on the campus. (Catherine, Learning advisor)

Nature connections and regenerative food growing

Learning activities often involved connecting with the environment through nature play, growing or harvesting food, or working with the chickens or bees. As well as building that physical and emotional connection to living things in and around the campus, this was also a way to orient learners and get them used to the campus space and what they could do there.

55 See <https://www.chchenvirohub.org/blog/te-tuna-taone>

We try to do nature play with nearly every age group that comes. It's hard to forget the wonder and the amazement of nature—that's what climate is—to preserve nature that we have. If they're not exposed to what we have, then preserving it doesn't seem that important. (Catherine, Learning advisor)

In the large vegetable gardening area, tunnel houses had been established so that schools that used the campus regularly would have their own place to plant and grow. The horticulturalist working with students described the focus as:

Regenerative agriculture and working with the land and not working against it. Doing right by the land and working with that and producing food. And I guess food security and food sovereignty, because kids take that knowledge home and share it with their families. (Sandi, Horticulturalist)

Some secondary school groups were working on Level 3 NCEA credits related to growing and harvesting crops. One secondary school had an NCEA Levels 2–3 class working on a unit standards project focused on creating benefit for the community. These students learned how to grow food from seed. Their project involved both sharing the food they produced, and preparing trays of seedlings to distribute to people in the community, with instructions to help them grow their own food at home. Another school was sending a small group of very keen intermediate-aged students to the campus regularly to get involved in activities to build food-growing skills and knowledge they could bring back to their own school.

You can see our garden [at our own school] is really worn out, the planting there will give us skills so we can plant here. Also learning about the weeds, how to cook new stuff. (Year 7 students)

These students were strongly motivated by a drive to “help the community” and really enjoyed this aspect of being at the campus.

We learned heaps since we got there about the community and being part of that. Like we learned that being a community is like, helping out other people, it's just like ... a very community campus. (Year 7 students)

Other independent projects and plans for an NCEA course

Some middle school (Years 7–10) students from Ao Tawhiti were coming out to the campus regularly to work on independent projects, such as learning how to build a pizza oven, helping to build the new bike track, and designing and planning a mural project.

At the start of the term we say a goal we want to achieve. For instance if I said I wanted to build a garden box and grow my own vege garden here, my teacher will say 'ok how are you going to do it, what materials and budget do you need to do it?'. If you can show that [planning] then you can [do the project]. (Year 8 student)

[I'd like to do] maintenance, I just like to build stuff, so I could build stuff that they need built. (Year 8 student)

In 2023, plans were being made for an NCEA “collaborative course” that could be open to any schools that would be interested. The plan was for some components to be delivered at the CAC, and some at each school's home site. The idea was that the course would comprise a set of shared achievement standards (likely in social studies) for all learners taking the course, in addition to an “a la carte menu” of additional achievement standards each school could offer. This would allow each school to draw on expertise within their own school and the disciplinary emphases they wanted to weave in, such as science, philosophy, English, geology, education for sustainability, and so on. Several secondary schools had indicated interest and were involved in planning conversations. However, only one school (Ao Tawhiti) was ready to go ahead with the course in 2024.

Views about climate education and climate action

Interviewees expressed a variety of views on what climate education and climate action should look like for young people. There were several points of general agreement—that it was important for young people to feel empowered through climate education and action, that avoidance of teaching around climate change was not helpful, and that having opportunities to connect with nature and have other hands-on learning experiences was important and good for wellbeing.

The best way is action and doing stuff. Understanding what it is, and feeling some degree of doing something. I think that sense of powerlessness is a terrible thing for kids or anyone to have. (Vicki)

There were different thoughts about what was appropriate or engaging for different learners at different times, in particular how much explicit teaching and/or connection to climate change should be wrapped around the hands-on, nature-based, and project-based learning. One approach was for these connections to emerge through conversations during learning. As with Te Ahi Kaa (case 1), these discussions often happened in outdoor spaces.

[The primary students] had climbed a tree and got really high, then they got down laying on grass, just looking at the daisies and the clouds, just having a great time, I was asking them how do you feel? ‘We feel so great, we feel so nice, so relaxed, excited, we feel good’. So we had a bit of discussion about how the health of the environment reflects in their internal sense of health and wellbeing and the importance of nurturing the environment, the environment can then nurture themselves, their health and wellbeing. (Catherine, Learning advisor)

However, some interviewees thought there could be more explicit climate knowledge-building, and the need to strike the right balance between engagement and knowledge-building.

If you just teach the academic [knowledge about climate change] they don’t feel they are making a difference, and if they’re just getting the practical they don’t realise the implications both positive and negative that it’s having on the climate as a result. (Catherine, Learning advisor)

Interviews with students suggested mixed understandings about the “climate” aspect of the CAC. Most students spoke enthusiastically about how much they loved coming to the campus. Students and some teachers talked about the comfortable “vibe” and sense of wellbeing that came from being at the campus. Interviews with younger students suggested they had a general understanding that it was a place to “have fun” and “learn about how to look after nature.”

The word climate, I am pretty sure it means something around plants and nature. (Year 3 students)

The concept of conserving resources and cultivating the environment to provide “for future generations” was also evident.

[CAC] has helped us understand like how to plant trees, how to re-use resources, not waste so much, and plant our own things. *What’s the connection to climate?* You kind of like embrace nature, something like that, you help nature to do its best. And we make that a better place. (Year 8 students)

[CAC] is really good for the coming generation because I think one thing that at a younger age needs to be taught is, how to respect the land and what comes with the land, knowing you have to respect it. Because no one owns it. (Year 8 students)

Interestingly, one Year 8 student said they “didn’t really believe” in climate change, yet was highly motivated to come and work on independent projects and expressing great pleasure in the opportunities available there, including cooking, gardening, mural projects, and working with chickens.

Connections with te ao Māori

Weaving te ao Māori into learning and activities at the CAC was still evolving. From the establishment of the campus, Niki was keen to involve the local mana whenua, Ngai Tūāhuriri, “as much as we can and as much as they want to be”, noting that there were often many demands on their time. A cultural narrative and design intent plan⁵⁶ was described as “incredibly valuable”, suggesting whaingā | values, and providing background and cultural context for the significant mahinga kai associated with the area. There was a desire to build relationships and bring in expertise and support from those willing and able to share mātauranga Māori with learners in a range of contexts.

It was hoped that eventually there would be someone who could bring whakairo/carving expertise and other arts to the campus. As discussed above, in 2023 a connection with a nearby marae had afforded some students the opportunity to learn local stories and histories of the river and mahinga kai while paddling in a waka. There was some discussion around establishing a traditional rongoā medicinal garden, potentially as part of a collaborative project working with youth struggling with disengagement from school and the community. In a general way, staff said they sought to weave in te ao Māori concepts as much as they could “and making the space to do it” through seeking connections to those with the expertise.

Mahinga kai is a huge aspect of what we teach. Matariki, the use of navigation, the atua, the use of stories and pūrakau. (Rachel, Learning advisor)

Interviewees, including students, wanted to see continued strengthening of te ao Māori in the campus.

Because New Zealand is home to Māori culture we should all have Māori culture there, and make it well known. Yeah, history on the people that were here before us about how the land is important. It's not just ours, it was someone else's before, we have to take care of it now, we are the guardians. I think it's just important for younger children and people to understand and respect Aotearoa's history. (Year 8 students)

Inspiring and empowering teachers from other schools

It was felt that the campus could provide teachers with inspiration and validation for learning and teaching approaches that might be harder to get started in their own schools.

Often the teachers and their kids that come here are quite siloed in their schools, perhaps the only one in their schools teaching climate or that feel it is important—so it's validating what they are doing and their desire to do it in the classroom. (Catherine, Learning advisor)

One group of intermediate technology teachers from Wellington who visited the CAC were struck by the “just do it” attitude, where ideas were quickly moved into action.

I think that's because they had so many connections to different groups that were coming in to help them, which I thought was really awesome. It wasn't just them that did everything. It was the whole community, as many people as they could get involved. (Intermediate teacher)

It was noted that different teachers or school leaders might have different levels of knowledge about climate and environmental teaching, and varying levels of comfort and expertise in knowing how to “activate the space” for learning outside the conventional classroom.

⁵⁶ Prepared by Matapopore.

It is so varied ... depending on the commitment by the teachers to support learning around climate change, from it being their whole focus when they come here, to wanting to deliver the structured programme that you would [run] in a classroom, but on campus. (Rachel, Learning advisor)

James, an assistant principal from Te Waka Unua primary school which had been using the campus for a couple of years, felt it was important to identify and enable teachers who were interested in taking a lead in this kind of learning space. For those teachers, the campus provided “a place to lead and try things with support”. For teachers who might not be so confident, the space could provide “a chance to take their kids somewhere and gain the confidence [to support learning in this way]”. The benefits of bringing whānau and community along were also noted.

Some of the dads that went [with their children’s class] ... they were so happy that their kids were out in a nature space, digging holes, climbing trees, they were buzzing that the kids had the opportunity to do that. (James, Assistant principal)

Liz, a teacher at Avonside Girls’ High, said that teachers across a number of learning areas had visited the campus. The river provided a point of connection between the former site of Avonside Girls’ High (now the CAC) and its new site, approximately 7 kilometres away. At the beginning of the 2023 school year, as a “getting to know you” experience, half the Year 9 student group started the day at the old site and paddleboarded along the river, while the other half of the group walked through the red zone. Both groups met for lunch at a central point, swapping modes of travel to walk or paddleboard the remainder of the distance to the new school site.

This site was really important in terms of mahinga kai, and so a lot of the plant life that grows around our river is best seen in our environment and it’s right on our doorstep, that connection from old site to new site, and looking at kai as we go. (Liz, Teacher)

Some schools saw benefits to having a connection with the CAC even if they weren’t planning to regularly bring students to the site for learning. Bianca, an environmental science teacher from Burnside Primary School, explained that her school was fortunate to have “huge grounds” and “many environmental opportunities happening at our school site”. One of her school’s ongoing projects was the B5 Project, which is to establish the right type of habitat to attract the native boulder copper butterfly that was once common in the area but had become rare due to human changes to the environment. A garden habitat for the butterflies was first built at her school, and then at various other sites around Ōtautahi Christchurch,⁵⁷ including the CAC.

We are now working with Climate Action Campus ākonga to build an endemic butterfly habitat with my tamariki advising as experts. It’s great to see kids teaching kids. We really value the relationship we have built with CAC and the opportunities it avails. (Bianca, Primary teacher)

Discussion

Many of the characteristics outlined in the NAAEE Guidelines for Excellence (see Section 2) were evident in the Climate Action Campus, including a “collaborative, welcoming, and responsive learning environment” with “locally-focused and community-driven” learning. Aspects of “civic engagement for climate action” were also visible, particularly in the kinds of projects that learning advisors hoped would develop and flourish on the campus. Learner engagement and wellbeing was a key focus,

⁵⁷ See <https://www.rnz.co.nz/national/programmes/afternoons/audio/2018783155/the-burnside-boulder-butterfly-project>

fostered through nature connections. Creativity, innovation, and learner-led projects were strongly encouraged. As with Te Ahi Kaa (case 1), climate-related knowledge and concepts were not always in the foreground. While some learners we spoke to found it hard to explain the “climate” aspect of the campus, they clearly saw CAC as a place to learn about how to keep the environment and people healthy, and a place where project-based learning interests could be pursued.

6. Climate course at Ao Tawhiti

It's been useful to talk it out in a class setting where there is lots of different points of view where you can listen and figure things out for yourself, you know? (Student)

Ao Tawhiti Unlimited Discovery (Ao Tawhiti) is the parent school to the Climate Action Campus described in the previous section. Ao Tawhiti is a Years 1–13 special character school based in central city Christchurch.⁵⁸ A fundamental tenet of the school is “that the child is central in directing their own learning so that the enthusiasm and love of learning is retained”.⁵⁹ Students have a high degree of choice in their learning and there is time every week for student-directed project-based learning. Teachers are known as learning advisors, and the school has no bell, no staffroom, and no uniforms. The school is housed in a multi-storeyed inner-city building that has a mix of specialist spaces and open-plan spaces. Being centrally located provides opportunities for learning to happen in and around the city, as well as in the school itself.

In 2022, Ao Tawhiti offered an interdisciplinary Āhuarangi | Climate course, co-taught by three teachers.⁶⁰ As with the previous cases, this example illustrated teachers’ willingness to try doing something “new”. Their approach was underpinned by an ethos of collaboration, and a desire to be responsive to young people’s needs, interests, and students’ requests for hopeful and constructive climate education.

The origins of the Āhuarangi | Climate course

The idea for the course was first raised at a 2021 teacher-only day designated for “Blue Skies” curriculum design.⁶¹ The prompt given to teachers was, “What courses would you teach if you didn’t have to consider NCEA standards, timetable constraints, or staffing?”. As Kate, a social science teacher explained,

A Google Doc was put up and people chipped in their ideas. Zack [science] put one in saying climate change. He added a few ideas, I [social science] added a few ideas, Brent [philosophy] added a few, the drama teacher added a few.

A few weeks later the teachers decided to go ahead with the course, and Kate, Zack, and Brent met in September 2021 to do some initial planning. In October 2021, they invited students to a meeting to hear students’ ideas about what a course on the climate issue should look like. Students said they wanted the course to be clear that it is possible to do something about the climate. Their suggestions included:

- focusing on why climate change matters
- having a multi-disciplinary focus (not just science and social sciences)

⁵⁸ The school opened in 2014 as the result of a merger between two previous special character schools, Discovery 1 school (a primary school) and Unlimited Paenga Tawhiti (a secondary school).

⁵⁹ <https://aotawhiti.school.nz/welcome/>

⁶⁰ We reviewed course materials and interviewed the three teachers who co-taught the course, and four students who took the course. Due to COVID-19 the interviews were done via Zoom.

⁶¹ The origins and design of the climate course were explained in an NZAEE webinar, 6 months into the course. See <https://www.nzaee.org.nz/professional-learning/nzaee-webinar-climate-education>

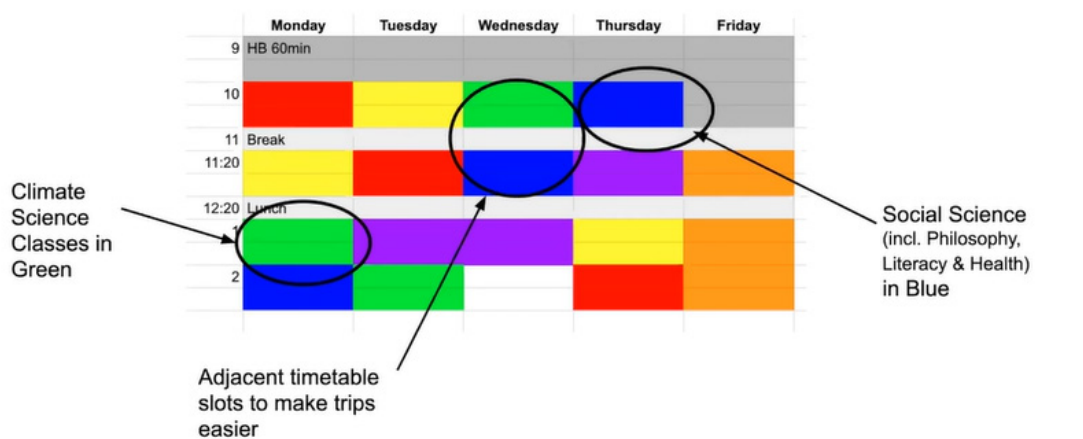
- teaching students how to look after their mental health while dealing with climate issues
- teaching students how to listen to people with different viewpoints “to understand where they are coming from”
- hearing from people outside the school.

Course structure and assessment

The course was pitched as a Level 1 NCEA course with a range of credits on offer from domains including science, social studies, and health, as well as literacy credits. The course was designed to run across four terms. It had two strands, defined by the school’s colour-coded timetable structure (Figure 7). The green strand, taught by Zack, had a science focus, while the blue strand taught by Kate and Brent had a stronger emphasis on social sciences, philosophy, health, and literacy. This structure also opened the possibility to run field trips with two adjacent timetable slots providing a half-day block.

In line with the school’s approach to student choice, students could choose whether to do one or both colour strands, and whether to do one, two, three, or four terms.

FIGURE 7 Timetable structure for the climate course



Term 1 focused on exploring different philosophies, beliefs, values, and traditions that frame relationships between humans and the environment (blue block), and developing students’ understanding of carbon cycle relationships between the greenhouse effect, greenhouse gases, and local and global sources and sinks/storage of these greenhouse gases (green block). The focus for the Term 2 was hauora, wellbeing and living lightly, manaakitanga, and human and animal rights. In Term 3, solutions and actions were in the foreground, with students identifying and taking action on matters that were meaningful to them. Term 4 provided space for finishing off assessments and going on field trips.

Appendix A summarises the planned credit offerings for each term. However, because students at Ao Tawhiti can opt into any course at any level, many of the students who joined the course in 2022 were Years 9 and 10 and did not necessarily choose to take up the opportunity to gain NCEA credits.

Who chose the course, and why?

About 20 students on average took the blue block each term, with some students moving in or out of the course at each term. Over half the students took at least two terms, but only about five students took all four terms of the blue block. For the green block, it was about 12 students per term. Just a handful of students took both the green and blue blocks.

We would have liked the majority in full programme ... But that's the choice-based model we do. (Kate, Social Science)

Teachers felt that students who chose the course tended to be those “who care about the issues”. They also suggested students who “liked discussing issues” did well with the course “because there was a lot of time for that”. When we asked student interviewees why they chose the course, they talked about being engaged by the course outline and the credit opportunities.

Kate, Brent, and Zack pitched it to us last year as an all-inclusive class about climate change, with also a host of assessment opportunities, so really good opportunities for us to get a head start to NCEA and also learn about awesome climate science stuff. (Student)

It was something that I hadn't seen before. I had been to a couple of other schools before and no other school had done something like that. So I thought I'd try it and have absolutely loved it. (Student)

Prior to the course, students had different levels of knowledge or interest in climate change, as illustrated by the two student comments below.

I am sort of an activist honestly, really, trying to find solutions. I try to do little things, doing things at home, planting trees, thinking about, telling my parents they should not be eating fish because of overfishing. (Student)

I didn't really have a view on it back then, I was just in the middle, I didn't pay attention to it. (Student)

What students liked about the course

Pluralistic issues-based discussions

Students spoke enthusiastically about the opportunity the classes provided for respectful, spacious conversations about issues where people held different perspectives. Topics that arose, sometimes from a student question or comment, included the environmental impacts of EVs, hydroelectric dams, and vegetarianism. Students enjoyed having the space and time to go deeply into issues, and hear what others had to say.

We have had good conversations that have taken a whole hour sometimes. Its good, because you gain more knowledge, gain other person's views, you question each other. (Student)

Sometimes it doesn't even feel like you are in class, you are just talking and it is fun. (Student)

Students also liked that they could gain credits from their engagement in these discussions.

Students felt “safe” and comfortable having these conversations because “we know what we say stays in the classroom” and this “draws people out to talk for longer”. They felt this built their confidence and enriched the range of voices heard in the class.

It's made me more confident, it's made me stutter a lot less. If I think before I talk I hardly ever stutter now. Also I quite enjoy, I know a lot more about climate change, I can have good conversations with people about it. (Student)

The blue block teachers, Kate and Brent, actively worked to create a classroom climate that scaffolded students' abilities to engage in respectful dialogue; for example, through modelling this themselves. Brent explained that if a student made a point he would try "to show that I really understand what they are trying to say" by expressing their idea back to them, before identifying ideas that might need to be challenged.

I will tell [the student] something I have learned from what they said, and then [say] "but I am not sure about this one point?". (Brent, Philosophy)

He wanted students to learn that "you don't always have to be right".

If it turns out I am wrong about something I will definitely make a big deal about it, celebrating in front of the students 'oh I was wrong and I have learned something new!'. (Brent)

Kate took a more structured approach; for example, using red or green pens which students held up to indicate whether they wanted to add a new topic to the discussion (red pen) or add on to someone else's idea (green pen).

I am not as good at thinking on my feet so it's a bit more structure. (Kate)

Well it's scaffolding, isn't it. If the students have never done anything like that before, it makes it safe for them. Once they do know how to [have dialogues in this way], they don't need to hold up a pen. (Brent)

Reflecting on worldviews

Students also enjoyed exploring different philosophies of the environment and being challenged to examine different moral and ethical implications of human beliefs and actions.

We humans think we are the dominant species to all other species on Earth. We think we are the only conscious animals but that is not the case. Other animals act conscious—or do we just act conscious? We just reformed [the question] again and imagined it was a robot dog that has the characteristics of one dog and acts, but isn't really conscious. It's just ones and zeros and a few parts. That burned our brains more or less. So we start to learn these new forms of questioning things, like is it really important or not, if animals have consciousness and [do] we have the rights to own them? (Student)

Brent, the philosophy teacher, said teaching in these areas had been good for his own learning, too.

I had to upskill in philosophy of the environment which wasn't an area of my expertise. (Brent)

We asked students if this helped them to reflect on their own worldviews. One student commented that "as a teenager [my worldview] is ever-evolving and everything is changing so fast in the world as well".

It's been useful to talk it out in a class setting where there is lots of different points of view where you can listen and figure things out for yourself, you know? (Student)

Positive and solutions-focused

Teachers and students talked about the positive and solutions-focused approach the course took. Zack, the science teacher, commented that developing an "optimistic mindset" and focusing on solutions was "important when exploring the dire science".

Making sure students could enjoy a year of being in this topic and not feeling super-down or stressed out. (Zack)

He found it was fairly easy to draw from recent news and science stories to design the course content. For example, in Term 1, when teaching about the carbon cycle, there was a news story about cultivating seaweed farms to sequester carbon. Rather than focusing on the atmospheric carbon cycle, “we looked at the marine carbon cycle because it’s relevant to Aotearoa New Zealand”. Some students had been captivated by the seaweed focus, and were still talking about it months later.

We learned heaps about seaweed—how big it grows, how fast, it puts out heaps of oxygen, if you feed it to cows, it reduced their methane release. You can use it as a fuel for cars. There’s heaps of other things, it’s incredibly healthy, things live in it, it would be good to put some in the ocean, it can create heaps of jobs for people. (Student)

Students also engaged in a variety of hands-on actions, such as going to the Climate Action Campus, learning how to build compost, and clothing repair.

Kate taught us how to knit and sew and repair our clothes, that was a good one. We brought things in to fix, we watched videos online how to do it, you’re just chill and relaxed and fixing things, and it felt like you’re achieving something. (Student)

Hauora | Wellbeing focus

In the blue block, students explored different ways of actively cultivating their wellbeing and dealing with complex emotions, recognising that these could arise from climate and environmental learning. Using Te Whare Tapa Whā (Durie, 1994), students developed their own personal SMART (specific, measurable, achievable, realistic, timely) goals that encompassed multiple aspects of wellbeing.

It wasn’t just physical wellbeing—it can also be mental wellbeing, that can translate into lots of things like playing piano to wind down or playing DnD with friends as a way to connect with people and ... whanaungatanga. (Student)

They also explored techniques including meditation.

Because [the course is] based around climate change and that’s quite a sensitive topic, we did a meditation and that was quite nice, quite fun to do. (Student)

Understanding wider systems and how to influence them

Students also talked about exploring some of the structural and systemic frameworks that enable or constrain climate change and climate action.

We have also gone into different political systems, capitalism, socialism, communism and how all of that can also affect climate change. Because, a lot is driven by [the] capitalist society we’re in and how we just want to consume and consume, all that stuff. (Student)

One student, a self-described activist, said the course had helped to provide a more complex and nuanced perspective on solutions.

For me if there is a solution I will go full at it. I just want to talk about it, do something about it, like it’s the one solution that will cure it. But the one solution is not the case. It’s a slow process, we have to think and execute stuff. Now I just think what is the case for that solution? Is there a problem that might happen, if we overexaggerate [claims]? (Student)

Students’ action projects

At the time students were interviewed, they were just beginning to think about what their action projects might be.

We were thinking about Māori representation in the school, not necessarily climate change but keeping wellbeing alive. Going to Port Hills and planting native trees and regrow native bush that was burnt in fires, or we also thought about ... stuff about keeping our waterways clear, continuing the work that we have done [monitoring the water quality and health of] the Avon River, and taking action towards that. (Student)

Other ideas that had been tossed around included having campaigns for people to bike, walk, skateboard, or bus to school to cut down carbon emissions, or a campaign to improve the school's waste management systems and the behaviours required for this to work properly.

There has been talk about how to sort that out, how to reduce our carbon footprints by not putting all our rubbish in the landfill. Even stuff like the school café, there has been talk about implementing coffee cups and compostable coffee cups—it doesn't even matter if they are compostable as they all just go to landfill. (Student)

When we interviewed teachers at the end of the year, Kate described the projects that had eventuated. These included a tree maintenance project with the city council, doing a collection for a charity, and a variety of other projects focused around other social issues. Kate explained that the course had come at climate change from a human rights and social justice perspective, and “had a lot of discussions about how these are interconnected. Ultimately in selecting their actions, students followed their interests, which were wide-ranging.

We've got many minds I guess in this group, and lots of ideas and active thinkers. (Student)

Empowerment and optimism

We asked students if they felt more empowered and optimistic as a result of the course. They felt that they did.

We don't have to be so gloomy about it, there is honestly just hope. (Student)

Before the course ... I just thought that the temperature was rising and we don't have many ways to fix it. I didn't realise how many ways you could help in your life. (Student)

We learned we need to look with a positive mindset and we can't have the negative mindset saying 'oh nothing's going to change, that will never work'. We have learned to open our mindset and to value things in a different way. (Student)

The students we interviewed all said they would recommend the course to other students.

Yes definitely, it's a good course, you learn quite a lot. (Student)

Teacher reflections on the course

When we interviewed Kate, Brent, and Zack at the end of the school year, they felt the course had gone well overall. Kate felt it was positive that they had “made a start” and was pleased they had taken action by offering the course soon after it was conceived.

It's easy to shelve a good idea—it's good we pushed ahead. (Kate)

However, because so many students had come into the course at Years 9, 10, and 11, they would not offer the course again the next year.

We felt like we covered the market [in 2022], if we did it again [in 2023] we might not get enough numbers. (Kate)

Rather than have students repeating the same course content, they thought it might be best to leave it for a year and offer the course again in another year or two.

What worked well, and what teachers might change

The aspects the teachers felt worked well included most of the things students said they had enjoyed about the course.

I guess the key takeaway it just to keep it positive and solutions-based, that kept them engaged and excited all year. (Zack)

Students liked the hands-on, the actions, the SMART goals, the workshops about how to live lightly on the planet, practical things like that. (Kate)

The environmental philosophy dimension was felt to be very important. Brent felt this had especially connected with students, and that looking at things from non-human perspectives was “something I think students don’t think about in relation to climate change as much as they should”.

The fact that students like animals and can see what this is doing to other creatures—they might not realise, you know, what climate change is doing to the natural world. It might give them more reason to want to do something about it. (Brent)

The teachers also thought it worked well to have the course taught by teachers from different areas of expertise. If possible, the teachers would have liked to add even more disciplinary teaching expertise; for example, drama or “anything from the arts”. Kate also thought the course would benefit from having even more hands-on learning, fieldtrips, and “getting people in” from outside the school.

Discussion

The Āhuarangi | Climate course reflected numerous themes in the climate education literature. Many aspects of the Bicycle Model, the Hope Wheel, and the NAAEE Guidelines were evident in the course design and teaching practices. Being an interdisciplinary and co-taught course seemed to be important in enabling breadth. The science components of the course contributed to knowledge-building about climate change causes and solutions. The social science and philosophy components supported students to explore worldviews and values, develop capabilities to engage in respectful, pluralistic classroom discussions, and develop habits and strategies to actively tend to their wellbeing. By exploring climate change from multiple angles, learners developed an appreciation for the complexities of the context, yet emerged feeling empowered and optimistic. While the course included some hands-on activities and student-led action projects, the course only touched on aspects that could be described as “civic engagement for climate action” (NAAEE, forthcoming). However, the knowledge and capabilities students developed in the course appeared to provide good foundations to continue to learn about, and engage with, climate-related issues on a local or national level.

7. Additional case studies

This section describes two further brief case studies. One involved primary students who participated in climate-focused learning in their school. The second case involved a secondary school where opportunities to strengthen sustainability and climate education were being explored.

Students from Next Generation Conversation, Ōtautahi

***You are not just learning the facts, you're learning what you can do to help.
You're not just learning about the big problem, you're learning about
smaller problems you can fix. (Years 7–8 students)***

In 2023 we interviewed a group of seven primary students (Years 7–8) whose class had been through the Climate Change Learning Programme.⁶² The students were very positive about the programme, which covered climate science, different perspectives on climate issues, various forms of action, creative projects, and the localised implications for their place.

It's not just a 'one and done' [course] like 'great I know how climate change works, stop here'. It's incorporating it more into everyday life and normalising it. Things that you can do every day, like walking more, not using single use plastic. (Years 7–8 students)

These seven students had chosen to become part of the Next Generation Conversation (NGC), a group of children and young people from several schools across Ōtautahi Christchurch who meet regularly with their facilitator to explore and take action on climate change.

We have quite a lot of debates and then we can get to [hear] everyone's opinion on the matter and what everybody thinks about it and we get to see a lot of different points of view. (Years 7–8 students, members of NGC)

Students from NGC have made submissions and given input on a range of local, national, and international climate-related matters. This has included Christchurch City Council's coastal adaptation framework, New Zealand's National Adaptation Plan (Ministry for the Environment, 2022), and the United Nations Rights for the Child committee with regard to climate change and children's rights.⁶³ The NGC model in relation to children's citizenship has been discussed by Ryder (2024).

Based on their experiences, the students had views about what people of different ages should be learning in relation to climate change. For younger learners, they thought it was important "to know what climate change is without having to know all the details". They felt young learners should have opportunities to learn how to care for the environment and to feel good while doing so. For older primary students, they thought it was a good age to learn more about climate change and have opportunities to explore what it means for themselves and their communities. They emphasised

⁶² The programme's design was coordinated by Future Curious and facilitated in Ōtautahi Christchurch by Sian Carvell. See <https://www.nzsee.org.nz/resources/climate-change-learning-programme>

⁶³ Additionally, NGC have made submissions to parliamentary inquiries into community-led retreat and adaptation funding, and given input to the Ministry of Transport around system shift and generational investment work and how it relates to climate change.

the value of hands-on actions like tree planting. They also described engaging activities such as role-plays, and creative arts projects to explore and communicate climate issues from different perspectives. Addressing concerns about young people’s wellbeing when learning about climate change, the students suggested it was important to learn what was really happening so that people would take it seriously. They felt that adults needed to be educated too.

I know it’s all focused on Gen Z to learn this but I think it would also be important for older people and adults to have more knowledge as well—especially my parents and grandparents, they weren’t taught that stuff and they don’t know how they can help. (Years 7–8 students, members of NGC)

Sustainability and climate learning at Hutt Valley High School

I kind of felt the world was getting ruined and I wanted to see what I could help or bring to [the problem to] help change it. (Year 12 student)

In 2022 we noticed that Hutt Valley High School (HVHS) had identified climate action in the school’s strategic plan, and we were interested to explore what this meant for the school. An initial roundtable hui was convened in May 2022 with NZCER researchers, the principal, three Year 13 student leaders, and about a dozen staff from different learning areas including science, mathematics, English, and Te Awakairangi (a sustainability education course offered at NCEA Levels 2 and 3). Later in the year, we interviewed teachers and students in Te Awakairangi, and two of Year 13 student leaders (prefects) who had an interest in advancing climate and sustainability education across the school.

Te Awakairangi: An NCEA course at Levels 2 and 3

Although not specifically focused on climate change, the course named Te Awakairangi encouraged students to explore social and environmental issues that they were interested in, and plan action projects that became the basis for their internal assessments. The “place-based” emphasis of the course was signalled by naming the course after the river that flows past the school. The course had started around 2017, and a few different teachers had taught the course since it began.

In 2022 there were four Te Awakairangi classes: two each at Levels 2 and 3. The classes began in Term 1 by exploring course concepts and the different aspects of sustainability. Students planned and carried out an action project for their first assessment.⁶⁴ Teachers liked that Te Awakairangi provided an opportunity for students to: “go out and do something good for the environment [and] get credits for actually going out and doing something good”.

We have had a lot of conversations about that in English and Drama and how as we move through the senior years they can get quite “doom and gloom” and dystopian, Handmaid’s Tale-ish. We don’t want to leave our young people feeling like there is nothing they can do. (Secondary teacher)

Among students who chose the course, some were already engaged and involved in things like school strikes for climate. Others were there “more because it offers literacy credits that they need”. Whatever their initial reasons, the students we interviewed all said they had enjoyed the course. In terms of action projects, COVID impacts had limited the scope of what some students could do in 2022. One particularly successful action project was a tree-planting project that had been sparked from a student’s home conversations.

⁶⁴ The achievement standards used in 2022 are shown in Appendix A.

I was talking to my parents and we came up with the idea of planting fruit trees, we talked about different aspects of sustainability: culturally, sustainability, economic, social. People could pick the fruit, it could help with economic issues, obviously it can't feed everyone, but it could help, I guess. The cultural things like Māori values of looking after the land, kaitiakitanga. If you plant along the river, it brings attention to the river ... Structurally [with] more trees on the riverbank, it's just gonna help. (Year 13 student)

In the end, fruit trees were hard to obtain, but making contact with the Hutt River ranger enabled the student to get native trees to plant instead which the student noted would be “good for wildlife” and “help return it to the way it was”. The project had required quite a lot of time and effort in terms of the communication and coordination with external parties, but ultimately the student felt it had been worthwhile.

Lots of our time it feels like oh it's out of our reach, we can't make change. Being able to understand I can actually make changes in the community [and that] it's not just me—other people [in the community] want to do it too. (Year 13 student)

Strengthening climate and sustainability education across the school

In late 2021, the incoming Year 13 Māori service captain and Year 13 environmental service captain at HVHS had expressed interest to the principal in working on strengthening climate and environmental education in the school.⁶⁵ Several meetings involving staff and students were convened in the first 6 months of 2022. The two student leaders felt this collaborative work with staff had been positive and showed students that there were teachers who were interested and had ideas.

It was fun working with the teachers' focus group—it was nice hearing what they wanted to do and wanted to achieve, just ideas they had, it was nice talking to them, it was really cool, it's been a very good experience. (Student leader)

While there was a desire to do more cross-connection and collaboration across subjects, practical challenges and barriers to curriculum innovation were also discussed.

It was interesting hearing from science and maths [teachers] and thinking about how we could collaborate more. That's something we've always been interested in as a school and just never quite managed to get it off the ground. (Secondary English/Sustainability teacher)

A lot of the things [teachers] said they wanted to do, they kind of went 'oh well we could probably never do that anyways because of roadblocks'. (Year 13 student leader)

As the year progressed, “things got hectic” with assessment and other time pressures, alongside the ongoing effects of rolling waves of COVID illness. Although things had not progressed as far as they had hoped, the senior students thought it was encouraging that Years 9–10 students were starting to come along to the student environmental committee meetings. They noted that succession planning was important to encourage younger students to step into, and eventually be ready to lead, in spaces like the environment committee.

Discussion

These two brief case studies round out the range of experiences presented across the previous four case studies. In the final two sections, we draw out themes and perspectives from across the six case studies.

⁶⁵ The environmental service captain had built up some climate activism experience and leadership through school strikes for climate.

8. He aha ngā āhuatanga o te ako āhuarangi “tōnui” nei | What could “flourishing” climate education look like?

At the end of all interviews, we asked participants what it would look like if climate and sustainability education was “flourishing”, in their school, and in schools across Aotearoa New Zealand. This section summarises their views.

What you’d see around the learning space

Participants envisaged learning environments that were rich with trees, plants, and animals. There would be gardens flourishing all around the school, growing lots of food for the community. Buildings would be powered by renewable solar or wind energy, and rainwater would be captured and used to water the gardens. Local materials would be used, and if buildings needed to be demolished or renovated, materials would be reutilised.

[You would see] big potted plants, maybe even having a tree going up throughout the school, maybe even having marshlands or a forest as a carbon sink around the school ... If it’s a new school build, constructing with sustainable materials that can last a while. (Student)

The learning sites would be a “living space, active all of the time”, with many projects happening, and people from the community involved alongside learners, with people “teaching each other and learning from each other”.

There would be a number of community experts that would come in and share their time and expertise with the young people. (Teacher)

The masses participating. All students, all people in our community getting the opportunity to learn how to grow kai, how to tend to the ngahere, how to live in relationship to the land, and be really connected to the natural environment. (Community leader)

Care and connection to the whenua would be the norm

Everyone would feel a sense of connection and care for their place, and this would be evident through practices that would be completely normal and routine (such as waste minimisation, composting, recycling).

It’s a way of life, it’s not just an educational programme at school, we need to be living this. (Teacher)

Students suggested each group might have their own area, like a class garden bed or other outdoor areas, to use and care for.

[There would be] a block [of land] for Year 9s and Year 10s, and so on. They can have their own workspaces and outside space. Whoever has the cleanest space at the end of the term or year, gets a reward. (Year 10 student)

Everyone at least has to participate in looking after it [Papatūānuku/the whenua], so it's not polluted. It's just what we started off with and it should be important to most people. So, instead of throwing out rubbish, it should be recycled or go into the bin, or just [create] less waste. (Year 11 student)

People would feel an affinity with the whenua.

Awareness of the environment and our connection to it. Remembering te ao Māori, this is our land and we have to take care of it. (Student leader)

Several participants said it was important “that mātauranga Māori is leading this too ... reviving the knowledge of the land”.

Being really aware of why we have Matariki and know about maramataka, seasonal living and seasonal growing. People would spend a good chunk of their time outside when the weather wanted us out there. We'd have more time with the whenua in summertime. (Community leader)

Learners would feel motivated and empowered to make a difference

Learners and teachers in the case studies tended to be those who had opted in to climate and sustainability-focused learning. To achieve a state of “flourishing” climate education, they would expect to see more learners seeking out and taking up these kinds of learning opportunities, and a clear sense that learners felt motivated and empowered as a result.

I hope you would hear people chatting about actions they have taken or things they can do, taking conversations about what they can do. (Year 11 student).

To attract more into this course and to get it flourishing and thriving, we have to make them feel really good about it, that they are making a difference and they can see it. (Teacher)

Students who take action and are empowered to make those changes. (Student leader)

Some students said they would expect to see students having “more confidence”, “asking more questions”, “being less antisocial”, and “stepping out of their comfort zones”.

Wider systemic changes would be happening

Some talked about the collective impacts in terms of wider societal changes, including “mindset changes”, and tangible changes around their communities and cities such as “more walkways, pathways, cycle lanes”.

Maybe in the social standpoint it would cross into our families and whānau, and everybody else and they would have different ideas about climate change, and that it would spread all over NZ and we'd try to find actions. And that would influence local elections, they would think more about sustainability and themselves as well. (Year 11 student)

If climate change was flourishing, young people adults would be seeking to bring about positive change, rather than being disengaged or denying that action was needed.

[Young people] would have this worry lifted up so they don't have to think so much about climate change. (Year 11 student)

It's hard for younger people, who will be around and see the drastic changes ... it's hard because then you have the older people who really have influence, but don't want to do anything because they won't be around. So you've either got to try to like make a difference for yourself or try to convince the older generation to start doing something. (Years 7–8 students)

Students spoke of feeling uplifted and supported when they connected with adults who cared and were taking action.

It's nice to feel like there's other people in this with you, and like, other people actually care (Years 7–8 students)

Discussion

Most interviewees felt that climate and sustainability education wasn't yet in a state of flourishing in their schools, and was certainly not yet flourishing across the education system. However, they felt there were some things that were going very well, and/or which had the potential to continue and grow towards a state of flourishing.

9. Ngā kaupapa i ngā rangahau whakapūaho | Themes across case studies

*It's nice to know you are making a difference in the world or trying to help.
(Years 7 and 8 students)*

This section summarises eight key themes that we noticed across the case studies, and offers concluding thoughts about what is needed for climate education to flourish.

A desire to do something positive

Teachers and leaders believed that climate/sustainability/environment/whenua-based learning was serving a need for young people. Some courses and programmes were designed directly in response to something students had asked for, while others were proactively developed with learner engagement and wellbeing in mind. Each case included teachers who were willing to trying new practices and approaches, supported by people in key leadership positions.

Some teachers and leaders reflected on the potential heaviness of climate and environmental issues and the potential difficult emotions that could be associated with this. Rather than avoiding these topics, leaders and teachers wanted to help students to develop a sense of agency, building relevant knowledge and capabilities to navigate in a climate-changing world. Whether they knew a lot or only a little about climate and environmental issues, learners said they enjoyed feeling they could do something positive and make a difference.

Practical activities as a route to learner engagement and wellbeing

Teachers and students described the holistic wellbeing benefits of hands-on activities such as environmental restoration, growing food, repairing clothes, painting murals, and doing things in and for the community. Learners and teachers felt empowered when they could take tangible actions, and see that wider-scale issues could be broken down into smaller-scale, and often localised, actions. Working collectively with others (including other learners, or people from the wider community) helped learners to feel like they were not on their own in trying to make a difference.

Connecting learning to whenua was meaningful and enjoyable for many learners, and was of particular significance for ākonga Māori. Where ākonga had access to Māori kaiako and mentors, te reo, tikanga, and mātauranga Māori could be experienced in practice. Caring relational connections could be fostered, and wide-ranging conversations about identity and whakapapa, turangawaewae, localised histories, tino rangatiratanga, food sovereignty, and other topics could be explored.

Different scales of action-taking

Across cases we saw some examples of individual/personal action projects (e.g., Te Awakairangi, or secondary students from Ao Tawhiti who came to CAC), and some examples of collective/group actions (e.g., whenua restoration in Te Ahi Kaa, presentations to the city council by the NGC). Some actions were focused on creating direct environmental and social benefits through working on the whenua. Others were about having influence and input into decision-making; for example, feeding into city council planning on climate adaptation. In contexts where there was encouragement for students to come up with their own action, the personal drive and motivation of the learner was important. Learners who were more motivated tended to put more time, focus, and energy into their projects, and to achieve more impressive outcomes. One interesting reflection is how schools might address the balance between learner-led projects, which may only exist while the students concerned are involved, and collective projects that could be long-term and additive. For example, in Te Awakairangi, students carried out action projects as part of their course and assessment, but said there tended to be relatively little sharing between students about their projects, with “each doing their own things”. Students were also not aware of what students in previous years had done. At CAC, there was scope for learners to pursue project interests individually or as small groups, but these could lead to tangible outcomes on the campus such as a new mural or pizza oven, that other users of the campus could see and benefit from. In Te Ahi Kaa, all ākonga worked collectively on a long-term whenua restoration project, but different skills and interests could be developed within this context.

Time (space) and place (whenua)

In their study of transformative timetabling practices, Eyre and Watson (2021) suggest that timetables “can be seen as an expression of the school’s beliefs about what is important for students to learn”. Several of our cases involved purpose-driven reorganisation of timetables to create more spaciousness for learners and teachers to get deeply into their environmental–climate learning and projects. Space and place (or land and whenua) was also an important dimension, though this was stronger in some cases than others.

Te Ahi Kaa and the Climate Action Campus were particularly notable in the ways that sustained, dedicated time and space for whenua-based and nature-based learning had been created. Both Te Ahi Kaa and the Climate Action Campus could be described as “third spaces”,⁶⁶ combining some characteristics of being a “school” with other characteristics that are more akin to other kinds of spaces (e.g., a marae, or other types of community space).

The Āhuarangi | Climate course at Ao Tawhiti (Section 6) shows another example of purpose-driven timetabling to create spacious blocks of time for deeper and wider learning. As an interdisciplinary co-taught course, more blocks in the weekly timetable could be linked together under the course’s umbrella. Drawing on different disciplinary lenses allowed students to explore climate change from multiple perspectives, and engage in different modes of learning.

Spacious time for learning meant that learners and teachers often had greater capacity to “run with” emerging ideas and opportunities. For example, teachers and students in the Climate course at Ao

66 Soja (1996) proposed a different way of thinking about space and spatiality. As explained in the Oxford Reference on third space theory, “First and second spaces are two different, and possibly conflicting, spatial groupings where people interact physically and socially: such as home (everyday knowledge) and school (academic knowledge). Third spaces are the in-between, or hybrid, spaces, where the first and second spaces work together to generate a new third space”. See <https://www.oxfordreference.com/display/10.1093/oi/authority.20110803103943995>

Tawhiti (Section 6) described multiple occasions in which an offhand remark or question had led to a lengthy hour-long class discussion or debate on a complex environmental issue. Rather than feeling pressured to rush through these discussions, teachers used intentional strategies to scaffolded students' abilities to engage in respectful dialogue, learn how to listen with curiosity, and be open to having their knowledge and perspectives widened.

In Te Ahi Kaa and at the Climate Action Campus, being in the māra (garden) or lying down in the grass afforded time and space for conversations and connection to self (what do I see, hear, feel?) and connections to others (whakapapa, where is my whenua, what is this kai we are growing, who is it for, what makes it healthy?). As noted in Te Ahi Kaa case study, Māori literature discusses temporal understandings of time as continuous, dynamic, cyclical, relational, bound to place and people, and whakapapa-based (King et al., 2022). Global authors have also discussed the emancipatory potential of rethinking taken-for-granted conceptions of time in education (Alhadeff-Jones) in the transition to a sustainable future (The British Academy, Ongoing).

Across cases, we also heard about various ways in which people wished there was “more time” for learning and action they could envisage doing—including more time to make connections to people, places, and projects in their local area. Curriculum and assessment arrangements were often identified as limiting factors. Assessment pressures were also discussed as limiting the extent of time and energy that senior students could put towards rich projects, particularly those that involved working towards some kind of real-world outcome such as a community-based or environmental action project.

Relational networks, leading to emergent opportunities

Another theme across several cases was the crucial importance of networks of supporting relationships with people and groups in the community. These relationships often had a reciprocal aspect. Learners could benefit from expertise, time, and resources that other people and groups could bring to their learning environment, while at the same time learners' activities were often intended to provide benefits to the community (e.g., growing food to share, teaching others how to grow food, or building a rongoā garden). Relationship networks also allowed for emergent projects and opportunities, including collaborations. This was particularly strong at the Climate Action Campus, but we saw examples of this across many of the cases. Sometimes it was teachers or leaders who tapped into wider community networks, and sometimes it was students; for example, connecting with businesses or councils as part of their action projects.

There was also interest in connecting with other learners and other schools to share ideas or work together. Where this had happened (e.g., NGC), students spoke of the benefits of connecting with students from a range of other schools, hearing about their views and experiences, and working on things together. In other cases, students had not had opportunities to connect with students from other schools, but liked the idea of doing so.

Beyond-school learning as an auxiliary to in-school learning

The climate education literature acknowledges that climate education also occurs in settings outside “formal” education spaces, including youth-led and community-based climate action groups. Groups like NGC might be considered another kind of “third space” approach, where small groups of young people from different schools come together, with facilitated extension learning, and opportunities

to engage and take action on climate change.⁶⁷ Another example was the Mana Ora project piloted by Auckland Council in 2023. This project provided facilitated learning and activation to small groups of students with a lead teacher from each school, empowering them to identify and carry out small decarbonising projects within their own schools (Bolstad, 2024). Models like these present ways to work with, or around, the limitations of what schools may be able to offer due to constraints of time, space, or expertise in climate education. However, students from NGC felt it was problematic that the opportunities they had had, weren't available to students in all schools.

It needs to be like, it's not very widespread. It's only in a few schools ... It needs to be a big programme.
(Years 7–8 students)

The interplay between within-school and outside-school climate education will likely remain piecemeal as long as the mandate for climate and sustainability education in the national curriculum remains vague.

“Climate change” not always foregrounded

One very interesting observation was the variation in which “climate change” and other related climate concepts were, or were not, explicitly and routinely discussed. In some cases, students were explicitly scaffolded to build climate-related knowledge.⁶⁸ In other cases, reference to climate language and concepts were often more indirect. Themes and language more often in the foreground included caring for environment, nature, kaitiakitanga, whenua and taiao, and intergenerational sustainability (i.e., taking care of things for future generations). A similar observation about climate-related language and concepts being in the background rather than the foreground was made in the evaluation of *Mana Ora: Students Decarbonising Schools* (Bolstad, 2024). Based on interviews across these projects, it was apparent that many teachers perceived climate change knowledge and language to be too heavy, difficult, or abstract, or not engaging/empowering for all learners (particularly younger learners). Some teachers were also less confident in their own climate knowledge and understandings and/or ability to teach about climate change, compared with other aspects of environmental and sustainability (e.g., growing, waste, water). There is also a case to be made that focusing explicitly on climate change does not sufficiently reflect a holistic, interconnected, relational, te ao Māori worldview.

The literature strongly supports the notion of climate education as broad, holistic, and interconnected with wider matters of environmental and social justice and human and planetary wellbeing.

From this perspective, all learning that involves developing a sense of care and connection to the environment, and building knowledge and capabilities that support the continued flourishing of the living world, are aspects of climate education. Broader concepts of education for sustainability and the environment are also supported by existing curriculum and teaching resources, and professional learning opportunities. However, there is also a case to be made for more explicit scaffolding to ensure that learners can connect these understandings to broader climate frameworks. The evaluation of Mana Ora suggested that direct teaching opportunities can support learners, teachers, and sustainable school advisers to “connect the dots” between climate change, and environmental/sustainability concepts that were more familiar to their everyday lived experiences. As discussed

67 Other New Zealand examples include the Blake Inspire forum (see: <https://environment.govt.nz/what-you-can-do/stories/blake-inspire-annual-forum-young-leaders/>), and the Impact Challenge (see <https://www.inspiringstories.org.nz/the-impact-challenge>). Various local and regional councils also convene forums and workshops for children and young people.

68 For example, climate justice in Year 10 social studies (Section 4) Āhuarangi | Climate course at Ao Tawhiti (Section 6), and students who participated in the Climate Change Learning Programme and NGC (Section 7)

in the Hope Wheel model (see Section 2), it is important for educators to ensure that learners' wellbeing is always supported, and that learners are empowered with opportunities for being part of constructive and collective change.

Connection to te ao Māori, and localised histories

The school contexts explored in this research were all English-medium, and the degree to which climate and sustainability learning involved connections with te ao Māori varied. Te Ahi Kaa was strongly framed in te ao Māori. Other examples included students exploring different worldviews in relation to the environment.⁶⁹ This was often where te ao Māori perspectives were explored and (in some cases) compared and contrasted with other lenses; for example, how the environment is viewed through the lens of capitalism. Students and teachers across contexts often expressed interest in strengthening connections to te ao Māori across their climate, sustainability, and environmental learning.

Because a huge part of Māori tikanga and culture is sustainability. Giving back to your whenua and taking care of it is pretty much the basis of Māori culture. (Year 13 Māori student leader)

Similarly, there was variability in the extent to which climate and sustainability learning involved exploration of the cultural and environmental histories of the places where learning took place (schools and wider local areas). Several of the Ōtautahi Christchurch schools referred to the cultural narratives that had been gifted to their schools⁷⁰ and knew about some of the significant features of their places; for example, as mahinga kai.

Across most contexts, students we interviewed said they would be interested in learning more about mātauranga Māori and about the histories of their places. Across contexts, teachers often commented on the need to keep building their own knowledge and connections with knowledgeable others.

Conclusion

Collectively the case studies shed light on some of the opportunities for climate-responsive education to “flourish”, while also illustrating some challenges that teachers, learners, and school leaders may experience in seeking to initiate and sustain deep sustainability and climate learning.

The literature indicates that for climate education to flourish across the system, policy supports would need to include interdisciplinary curriculum guidance, teaching resources, teacher professional development, and clarity of long-term vision about the role of education in responding to a climate-changing world.

⁶⁹ For example, the Year 12 and Year 13 NCEA courses included achievement standards AS90812 and AS901736, which ask students to describe and analyse different worldviews and their associated values and practices, in relation to sustainable futures

⁷⁰ See <https://www.educationalleaders.govt.nz/Leading-change/Maori-education-success/Embracing-cultural-narratives>

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APPENDIX A

Planned credit opportunities for the course

TABLE A1 Planned credit opportunities for the Climate course at Ao Tawhiti

Term 1: Beliefs about Nature and Stuff	<p>Blue Block Assessment (NCEA Literacy Unit Standards)</p> <p>Write to communicate ideas for a purpose and audience (26622) 4 credits</p> <p>Read texts with understanding (26624) 3 credits</p> <p>Actively participate in spoken interactions (26625) 3 credits</p> <p>Green Block Assessment</p> <p>AS90953 - Demonstrate understanding of carbon cycling - 4 credits - internal</p> <p>AS90951 - Investigate the biological impact of an event on a New Zealand ecosystem - 4 credits - internal</p>
Term 2: Hauora/ Well-being and Living Lightly, Manaakitanga, Human and Animal Rights	<p>Green Block Assessment</p> <p>AS90925 - Carry out a practical investigation in a biological context, with direction - 4 credits - internal</p> <p>AS90935 - Carry out a practical physics investigation that leads to a linear mathematical relationship, with direction - 4 credits - internal</p> <p>Blue Block Assessment</p> <p>AS 90971 Health Internal Level 1: 3 credits (literacy) Take Action to Enhance an Aspect of Personal Well-Being</p> <p>AS 91043 Social Studies Internal Level 1: 4 credits Describe a Social Justice and Human Rights Action</p>
Term 3: Solutions and Actions	<p>Green Block Assessment</p> <p>AS90935 - Carry out a practical physics investigation that leads to a linear mathematical relationship, with direction - 4 credits - internal (continuation of learning from Term 2)</p> <p>AS90926 - Report on a biological issue - 3 credits - internal</p> <p>Blue Block Assessment</p> <p>91042: Report on personal involvement in a social justice and HRs action, 4 credits</p>
Term 4: Student choice and finishing off	<p>Finish off assessments, organise some field trips and take the time to look at an area of your choice.</p>

APPENDIX B

NCEA Achievement standards used in Te Awakairangi in 2022

We were told that in different years Te Awakairangi drew on Education for Sustainability (EfS) standards, English Standards, senior social studies standards that weren't already being taught in the school. For 2022 the Level 3 course was streamlined to focus just on EfS standards. The NCEA standards offered at each level are shown below.

TABLE B1 Te Awakairangi Level 2 NCEA assessments in 2022


Education for Sustainability	90810	Plan, implement and evaluate a personal action that will contribute towards a sustainable future (2.1)
Social studies	91282	Describe personal involvement in a social action related to rights and responsibilities (2.4)
Education for Sustainability	90812	Describe world views, their expression through practices and activities and the consequences for a sustainable future (2.3)
Education for Sustainability	90813	Describe values and associated behaviours in relation to a sustainable future (2.4)
Education for Sustainability	90815	Work cooperatively to develop and present a strategy or design for sustainability in response to a future scenario (2.6)

TABLE B2 Te Awakairangi Level 3 NCEA assessments in 2022

Education for Sustainability	90828	Evaluate a planned personal action that contributes toward a sustainable future
Education for Sustainability	90829	Investigate the interrelationship between humans and a biophysical environment in relation to a sustainable future
Education for Sustainability	91736	Analyse how different worldviews, and the values and practices associated with them, impact on sustainability
Education for Sustainability	90831	Describe policies and practices, their development and contribution to a sustainable future
Education for Sustainability	90832	Develop and justify a strategy for an organisation that will contribute to a sustainable future



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