# Toward a Sustainable Wellbeing Metacurriculum for Secondary Schools in Aotearoa New Zealand

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# Abstract

We live in a time of burgeoning global population, social extremes and cultural complexity for which, as a species, we are poorly prepared. The mining of fossil fuels and the extractive industries which have powered this reproductive and material success have accompanied our ever-increasing separation from nature, one another, and ourselves. This study is based on the premise that educational transformation, centred on Sustainable Wellbeing, particularly in senior secondary schooling, is crucial to the regeneration humanity needs in the Anthropocene to surmount the complex environmental, social, and cultural crisis that our collective ignorance has brought. It explores what a Sustainable Wellbeing Metacurriculum (SWM) framework for this age group—inspired by a Complex Systems Theory, Critical Realist, and New Materialist synthesis—might look like and what practices, strategies, and changes within schools, communities, and Aotearoa New Zealand as a nation would encourage the metacurriculum's widespread adoption.

The study examined theoretical positions regarding sustainability, wellbeing and curriculum, and drew on the principles of fractal self-similarity and scale-free social networks from Complexity Theory to construct an initial minimal framework. This framework was then elaborated, modified and tested, in an iterative co-construction process. The research design was a modified Delphi Survey. Twenty-three experienced secondary school teachers with a wide range of subject specialities contributed to the study, participating in one to three survey rounds, and/or semi-structured interviews. These data were supplemented with document analysis and school demographic and academic attainment data.

Participants were asked for suggestions of Knowledge, Issues, and Big Ideas most important to include within each of the three framework domains; Ecosphere, Social Justice, and Cultural Vision, at the Human-Societal level of an SWM. Within the corresponding domains of Action, Feeling, and Thinking at the Individual-Interpersonal level, the teachers were asked for suggestions of skills, competencies, and dispositions important for students' wellbeing. At the Human-Societal level, nine subdomains, each with sets of Sustainable Wellbeing goals following a complex fractal pattern, self-similar to the domains, emerged from the analysis of suggestions. At the Individual-Interpersonal level, similar fractal patterns for Action, Feeling, and Thinking were observed. However, teachers also emphasised deep qualities, such as Self-Awareness, and Adaptability, which are unique idiosyncratic integrations of Action, Feeling, and Thinking in individuals. The participants were asked to consider the ideal balance between Cross-curricular Holistic (CCH) and Subject-Based Specialist (SBS) modes of pedagogy for an SWM timetable. The mean suggested timetable share for the CCH mode was 39% but the distribution of preferred proportions was distinctly bimodal.

Participants were also asked to provide teaching Unit outlines based on the emerging SWM framework that linked the Unit's anchoring and connected Human-Societal level subdomains to specific learning areas of the New Zealand Curriculum (NZC) and New Zealand's National Certificate of Educational Achievement (NCEA). Epistemic links were apparent between the framework's Ecosphere subdomains and the NZC learning areas of Technology, Social Science, Science and Health & Physical Education. Further research with a larger sample of Units would be required to explore the possible links between the framework domains of Social Justice and Cultural Vision and the NZC learning areas of the Arts, Languages, English and Mathematics.

The thesis adopts an analogy, based on the complexity theory concept of strange attractors, to describe educational transformation as a system phase shift from the attractor's current 'Business as Unsustainable' state to an emergent Sustainable Wellbeing Metacurriculum state. Based on the findings, the schools of the participating teachers in this study were categorised as following one of

four types of trajectory within the attractor, relative to the SWM state i.e. Explorative, Innovative, Prospective, or Realpolitikal. Key strategies used by Explorative and Innovative schools which are making the most progress towards Sustainable Wellbeing include: working with the willing; disaggregation into streams for large schools; aggregation for small schools sharing resources, like gardens; school and teacher leadership for student agency, including making Sustainable Wellbeing a core subject; Trades Academy partnerships; enabling 'student voice' particularly in curriculum development; structural support for CCH team teaching; involving a wide range of subjects and year levels in CCH programmes; using mentoring, portfolios and self-reflection to foster student self-integration; and commitment to on-campus sustainability practices.

The most mentioned changes needed to enable a transition for schools to enact an SWM were a convincing argument and plan, followed by, sufficient time to plan and make the changes required, and the provision of relevant teacher training. At the local community level, teachers in 'Prospective' schools described community anxieties around the implications of a broader CCH curriculum for students' Qualification and Employment prospects. Teachers in 'Explorative' schools emphasised the importance of community education and school outreach. There was a strong consensus that engaging all citizens in a conversation about the purpose of education in our time would be the most effective change strategy to support at the national political level.

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To my PhD candidate colleagues Thomas, Thea and Ria, how fortuitous it was that we arrived at the same time and place on this mission of advancing Climate Change, Nature Connection, and Sustainable Wellbeing education. It has been so great to have journeyed with you, worked together and to have reinforced one another's aspirations.

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Sustainable Wellbeing to You All.

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# Glossary

| | |
|---|---|
| 21CFF | Twenty-First Century—Future-Focused |
| AO | Achievement Objectives, (In the New Zealand Curriculum (NZC)) |
| BaU | Business as Unsustainable |
| CAS | Complex Adaptive System |
| CCH | Cross-Curricular Holistic |
| CR | Critical Realism |
| CT | Complexity Theory |
| CT-CR-NM | Complexity Theory-Critical Realism-New Materialism |
| EfS | Education for Sustainability |
| EfSW | Education for Sustainable Wellbeing |
| EOTC | Education Outside the Classroom |
| ESD | Education for Sustainable Development |
| FTTE | Full-Time Teacher Equivalent |
| H-S | Human-Societal |
| ICI | Informal Confidence Interval |
| I-I | Individual-Interpersonal |
| ISC | Innovation Stream Curriculum |
| KOTP | Knowledge of the Powerful |
| MoE | New Zealand Ministry of Education |
| NCEA | National Certificate of Educational Achievement |
| NM | New Materialism |
| NZC | New Zealand Curriculum |
| NZQA | New Zealand Qualifications Authority |
| OECD | Organisation for Economic Co-operation and Development |
| OGD | Outcome Goal Descriptors |
| PCA | Principal Component Analysis |
| PISA | Programme for International Student Assessment |
| PK | Powerful Knowledge |
| QoL | Quality of Life |
| RAS | Review of Achievement Standards |
| SBS | Subject-Based Specialist |
| SD | Sustainable Development |

| | |
|---|---|
| SDG | (United Nations) Sustainable Development Goals |
| SLT | Senior Leadership Team |
| SRPK | Social Realist—Powerful Knowledge |
| SW | Sustainable Wellbeing |
| SWG | Sustainable Wellbeing Goal |
| SWM | Sustainable Wellbeing Metacurriculum |
| TMSA | Transformational Model of Social Activity |
| TSF | Triadic Sierpinski Fractal |
| UE | University Entrance |
| UN | United Nations |

# Chapter 1 Introduction

## 1.1 Why this Study? Why Now?

This thesis was motivated by the desire to put before my academic peers, teacher colleagues, and students a step-change idea for how secondary schooling could be more effectively addressing humanity's reality in the Anthropocene. I wanted to invite them to carefully consider, critique and hopefully, enthusiastically elaborate on the idea through the co-construction of a Metacurriculum framework. The idea—which I have provisionally named the Sustainable Wellbeing Metacurriculum (SWM)—has been evolving in my mind over many years of a career that included spells as a forest and farm labourer, forest researcher; a high school teacher—in both a state-integrated Rudolf Steiner and mainstream state schools—and as an education Masters student. The idea is a synthesis for me of many influences and interests including global environmental sustainability, human wellbeing, a fascination with Complex Adaptive Systems theory, and the art and science of education. Complex Systems theory offers a way of thinking realistically about human beings, societies and human artefacts as inseparably part of nature. It offers a path toward overcoming the habit of polarised thinking that afflicts educational paradigms and the political life of humankind generally. The SWM is a gesture toward a unifying vision of humanity's evolution. A vision that may reverse the increasing divergence between holistic worldviews valuing the collective—such as Taoism, Mātauranga Māori, and other Indigenous conceptions of the universe—and the specialised, refined but purposefully separated disciplines and mindsets of the Western capitalist worldview and education, with their underpinning egotistic and materialistic values (Bettache, 2024) that have through their fossil-fuelled hegemony (Wright et al., 2021) led to our current global ecological crisis.

People's behaviour is deeply rooted in their worldviews and those roots are largely put down in childhood, consolidated in young adulthood and, unless deliberately re-examined, largely unconscious in adulthood. That is why I argue that the transformation of education, particularly in the secondary senior years when young people are making crucial decisions for their life's direction, is a priority for humankind with enormous potential leverage. My daily news feed leaves me in no doubt about the urgency of our crisis and the growing potential for conflict over how to meet it. Being a Matua (father) of two tamahine toa (strong daughters) and koro (grandfather) of four fine mokopuna (grandchildren), as for many of my generation, this project is very much a path of the heart and a matter of our legacy.

## 1.2 Research Questions

When I first proposed my SWM idea as a PhD research project to my supervisors at our first face-to-face meeting, it soon became apparent that this research needed to go beyond simply the co-construction of a metacurriculum framework. It needed also to ask what might enable or constrain the wider acceptance in New Zealand education of such a metacurriculum and what strategies schools wanting to adopt an SWM in a diverse range of social structural and community contexts might realistically adopt. We agreed that an effective research design for this process of co-construction and consultation would be some form of modified Delphi survey of three or four rounds involving a panel of experienced secondary school teachers from a range of schools across the country. This led me to the following main research question and three related subquestions.

> What would enable secondary schools in Aotearoa New Zealand to establish a Sustainable Wellbeing centred Metacurriculum (SWM) for their years 11 to 13 students?

The overarching question is given operational direction by way of three sub-questions:

1. What would/could a framework for an SWM co-constructed with teachers look like?
2. What links would/could teachers establish between the SWM framework, the New Zealand Curriculum learning areas, and National Certificate of Educational Achievement (NCEA) standards or other appropriate school leaver qualifications?
3. How can the uptake and development of the co-constructed SWM framework for years 11 to 13 students amongst Aotearoa New Zealand secondary schools best be enabled?

## 1.3 Key Concepts in this Thesis

### 1.3.1 Terminology

In the Glossary section (page xvi), I have listed the key acronyms used throughout the thesis. The meanings I associate with several key concepts are also important to establish clearly at the outset.

### 1.3.2 'Sustainable Wellbeing'

The meaning of the phrase 'Sustainable Wellbeing' (SW) is discussed in Section 2.4.8 as it appears in the literature and Section 4.3.4 as it was interpreted by my research participants in the first round of my Delphi Survey. I use the phrase to describe a condition applicable to living systems in the most general sense possible. 'Sustainable Wellbeing' includes the idea of a healthy birth and also dying well. It does not mean 'living forever'. None of my participants interpreted the phrase in this way, but I make this point for clarity since that is one possible literal translation.

The phrase 'Sustainable Wellbeing Metacurriculum' (SWM), as it appears in my main research question, refers to an idea about formal schooling which includes not only the design of curricula but also appropriate pedagogies, systems of assessment and qualification, the professional social structures of schooling and the physical, built and natural environments of schools. In short, it is a whole-school concept (Eames et al., 2013). The 'SWM framework' of research subquestion 1, is more closely defined. It refers to the conceptual structure of levels, domains, and subdomains organising the Cross-Curricular Holistic (CCH) mode of the metacurriculum centred on Sustainable Wellbeing as a discipline in its own right, and also the emerging relationships of that discipline with the established disciplines of the Subject-Based Specialist (SBS) mode of the metacurriculum. Those relationships are the subject of my second research subquestion.

### 1.3.3 Education for Sustainable Wellbeing EfSW and Climate Change Education

In this thesis, I adopt the acronym EfSW for 'Education for Sustainable Wellbeing' and position the SWM concept as its most effective form. EfSW has much in common with what has been termed Climate Change Education by other authors (Bolstad, 2020; Cheatham, 2022; Eilam, 2022; Everth et al., 2021b; Hackerott, 2021; Nagelhout, 2024; Will, 2023). Both emphasise the urgency with which Climate Change is constantly reminding us about the unsustainability of our global civilization and the inexorably increasing cost of ignoring it. Both emphasise that the drivers of, and remedies for, Climate Change involve not only physical processes and environmental resources, but also Social Justice, and

Cultural transformation challenges. The co-construction of a Metacurriculum for EfSW which is the first outcome of this thesis, has not to my knowledge been attempted anywhere for Climate Change Education. In this thesis, I use the phrase 'Climate Change' to refer to the physical climate phenomena associated with the dynamics of the complex adaptive solar-earth-human system as a whole. The causes and consequences arising from anthropogenically-driven Climate Change are symptomatic of, not equivalent to, our Sustainable Wellbeing crisis. I have opted for the phrase 'Education for Sustainable Wellbeing' over 'Climate Change education' because 'Climate Change', in my view, is associated in most people's minds primarily with this physical systems interpretation of the phrase rather than with its social and cultural determinants. Furthermore, 'Climate Change Education' might suggest purely adaptive, fatalistic responses, to our Sustainable Wellbeing crisis, rather than including environmental, social and cultural mitigation strategies and the building of students' agency toward surmounting the Anthropocene challenge.

### 1.3.4 Complexity

Complex systems thinking is a foundational theoretical orientation for this research project. Complexity as a concept is referred to in the academic literature in many different ways reflecting the vast scope of its applicability. Likewise in this thesis, I have used a variety of phrases to emphasise this or that aspect of complexity as appropriate to the various contexts I address including complex systems theory, complexity theory, complex adaptive systems theory, complex systems dynamics, complexity thinking, and complex systems thinking. The main distinction among these terms for me is the inclusion of the words 'theory' or 'thinking' in the phrase. I use 'theory' to refer to the work of scientists, and mathematicians to understand and model complexity, principally through the use of computer modelling and graphics. I use 'thinking' in the phrase to express a more general and metaphorical use of the concept which includes complexity theory, but also a less precise, less restricted more metaphorical, and pandisciplinary appreciation of real-world complexity.

### 1.3.5 The idea of a metacurriculum

In the first round of my Delphi Survey, after asking my teacher participants for their views on Interdisciplinary and Disciplinary school and curriculum structures, I asked them how they understood the word 'metacurriculum'. The most popular group of responses as I describe in Section 4.4.3 was "Pandisciplinary". This interpretation accords well with the provisional definition I gave them in the following section of the survey as my point of reference, before asking for their views on what Knowledge, Issues, and Big Ideas are most important to include in a Sustainable Wellbeing Metacurriculum for years 11 to 13 students. It stated:

> In my research I take the term 'metacurriculum' to mean; some coherent construction of Interdisciplinary and Disciplinary education that connects all elements to a central organising ideal.

Among the various other meanings that the teachers suggested was "a curriculum about curricula". This phrase neatly captures the self-referential meaning of meta—as in metacognition or metadata—and also the self-organising aspect of complex adaptive systems. One of the significant findings of this study has been the importance, for the success of an SWM, of engaging senior secondary school students in the design and evolution of the curriculum they are following, as integral to their education. The word metacurriculum, like the word "metadiscourse" (Davis & Sumara, 2006, p. 7) should not be taken to mean a master curriculum of all conceivable knowledge, such as the elusive

unified ‘theory of everything’ physics seeks for instance, through the unification of general relativity with quantum mechanics. From the complexity theoretical perspective that I adopt in this thesis, reality is fundamentally irreducible and no such abstract theory of everything, apart from reality itself, exists. Nevertheless, a metacurriculum strives continually to include all worldviews and perspectives it encounters and to resolve any inconsistencies through creating a wider coherent synthesis.

### 1.3.6 Business as Unsustainable

Throughout the thesis, I have used the acronym BaU, commonly read as ‘Business as Usual’ with a pejorative overtone, to refer to the traditional exclusively disciplinary approach to secondary school education. I ask the reader to instead interpret the phrase as meaning ‘Business As Unsustainable’. This study is about transforming society through education from a BaU to an SW worldview. ‘Business as Usual’ in that context is problematic, since the goal is to reform ‘Business as Usual’ so that it becomes Sustainable Wellbeing.

## 1.4 the New Zealand education system

New Zealand's education system is decentralized, with the central government setting guidelines and providing funding, and educational institutions governing day-to-day operations. Schools are run locally by Boards of Trustees which are defined as Crown Entities with their responsibilities defined by by the Education and Training Act 2020. The administrative frameworks of most relevance to mainstream secondary schools are the New Zealand Curriculum (NZC) (NZ Ministry of Education, 2007) and New Zealand’s National Certificate of Educational Achievement (NCEA). The NZC has been described as “a document of two halves” (Hipkins et al., 2016, p. 147). The values, principles, and key competencies of the curriculum’s front half are strongly influenced by the holistic high-level aspirations of the Twenty-First Century future-focused trend within global education. The back half is oriented toward the traditional structure of K-13 education by learning areas, disciplines, and developmental levels. What the NZC does *not* do is show how teachers might weave the high-level aspirations of its front half into the subject-based achievement objectives outlined in its back half (Hipkins et al., 2016). This challenge to total curriculum coherence is characteristic of modern education systems globally, not just in New Zealand (Reimers & Chung, 2016) and is the reflection in education of the general trend toward polarization of holistic-synthesising from specialist-analysing worldviews. A polarization that makes the emergence of a convincing plan for a unified view of educational purpose, such as the SWM aspires to be, an existential necessity.

## 1.5 Thesis structure preview

The thesis is organised into four main parts. Chapter Two reviews the relevant literature. Chapter Three outlines my methodology and research design. Chapters Four, Five and Six present the study findings, and Chapter Seven completes the thesis with a discussion of the most significant findings in relation to other relevant education literature, the limitations of the study and recommendations for policy, practice and further research.

# Chapter 2 Literature Review

## 2.1 Overview

The Sustainable Wellbeing Metacurriculum (SWM) is an invitation to reconceive the purpose of secondary school education, especially for students in years 11 to 13 in Aotearoa New Zealand in the third decade of the twenty-first century. It is a phrase used to invite unprejudiced re-examination of what knowledge will be of most worth to these young people and what transformation of established schooling systems may be required in light of the scale and complexity of the existential challenges this and future generations are facing. Given also that these challenges have never been experienced by us their teachers nor any previous generations of teachers, where do educators begin, if they accept that transformation, and not merely reform, really is required?

This review of the literature relevant to the challenge of not only conceiving of but also realising an SWM begins in Section 2.2 with an examination of the roots of humanity's existential crisis in what we have come to call the Anthropocene (Haraway, 2015; Randall, 2022); that is disconnection from nature, from one another; and from ourselves. Complex Adaptive Systems Theory is a stream of Western academic thought compatible with global Indigenous and Eastern philosophical traditions founded on an acceptance of the interconnectedness of all things. In Section 2.3 I investigate the elements of complex systems thinking and find concepts, and geometric analogies that are useful for the SWM exploration. In Section 2.4 I review the diverse ways in which the words 'Sustainability' and 'Wellbeing' have been interpreted internationally and in Aotearoa New Zealand, and particularly in Education. Also in this section, I define and make a case for the two levels and three-domain structure I adopt for Education for Sustainable Wellbeing (EfSW). In Section 2.5 I explore the inescapably political nature of curriculum theory, particularly as it relates to Sustainability, the perennial contest between holistic and specialist approaches to education, and the way these influences are expressed in the New Zealand Curriculum (NZC) (NZ Ministry of Education, 2007) and New Zealand's National Certificate of Educational Achievement (NCEA). In Section 2.6 I set out the theoretical basis and argument for the minimal SWM framework which served as the starting point for the co-construction, with my research participants, of an implementable SWM framework, as explained in Chapter 3

## 2.2 The Anthropocene Sustainable Wellbeing Crisis

### 2.2.1 Time capsule—the poly-crisis circa 2024

Like so much else in our time, academic research in 2024 is increasingly stretched between the need to assimilate and respond effectively to the latest unprecedented developments—climatic, political, technological or cultural—and the search for pragmatic, long-term pathways toward wellbeing based on profound insights and eternal principles. The pursuit of Sustainable Wellbeing it could be argued has always guided human action. As a consequence of accumulated misguided or incomplete understanding of our planetary limits and the exponentially increasing consequences of our reproductive success and concurrent environmental pollution, our attention in the third decade of the twenty-first century is now demanded by one event after another related to unsustainable dysfunction in our relationships with the natural world, social justice, or cultures other than our own. The contemporary situation is referred to with various terms such as poly-crisis (Sachdeva, 2022) or meta-crisis (Milbank & Pabst, 2015; Zamorano Llena et al., 2023). 'Eco-crisis' (Kaukko et al., 2021) is

also a phrase, that for me, points to the root of the problem. Essentially the crisis is one of human disconnection. As Musson (2024) notes "Whilst in some ways we have evolved to extraordinary levels of [digital] connectivity, ironically we find ourselves suffering from all of the symptoms of chronic disconnection" (p. 20). This disconnection, from the rest of nature, from other people, and from self, is humanity's Sustainable Wellbeing crisis. Climate Change is the leading edge, the most urgent unintended consequence of our disconnection.

Positive trends in the direction of true Sustainable Wellbeing are also evident but to date, they are regarded as insufficient to avoid collapse (Ambrose, 2023). We are leaving the calm, 12-thousand-year idyll of the Holocene and are beginning to feel the turbulence of the unknown Anthropocene. I use the term 'Anthropocene' here to mean no more than the age in which the human population of Earth is likely to exceed the maximum carrying capacity of the planet for our species before falling back to either managed or chaotic levels under the influence of planetary system corrective processes. The term is however not only problematic in terms of its precise definition (Randall, 2022), but also for its sociocultural implications. Klein (2017), for instance, argues that 'the Anthropocene' effectively represents humans as an undifferentiated mass equally and collectively responsible for the costs and enjoying the benefits of the age, when this is very far from the truth.

The purpose of Section 2.2 is to provide some current—albeit soon to be outdated—examples of humanity's impaired connections with nature, society, and self; to review what the literature says about how they are related, to how we might collectively manage our long-term sustainable wellbeing, and the implications of this knowledge for the evolution of secondary school education.

### 2.2.2 Nature-Disconnection, the Proximal Cause

*Anthropogenic Climate Change*

Anthropogenic climate change is a consequence of our failure to appreciate and live within the ecological limits of our biosphere. It is a symptom of our disconnection from nature, which is the proximal cause of humanity's accelerating global sustainability crisis. Dependence on carbon-based technologies—that pump waste gases, mainly carbon dioxide, and methane into the Earth's atmosphere—is driving global warming and increasing the risk of extreme climate change. These technologies also dump waste materials including plastics and toxic chemicals into waterways and landfills, further exacerbating habitat destruction and accelerating biodiversity loss (Almond et al., 2022; Díaz et al., 2019; Kedward et al., 2023; Richardson, 2022). Climate extremes, nutrition insecurity, and biodiversity collapse are all symptoms of our inability to effectively manage the effluent of our global, industrial Business as Unsustainable (BaU) livelihood, which now threatens us with ecological and economic collapse within the next few decades (Masson-Delmotte et al., 2018; NZ Ministry for the Environment, 2019; Quiggin et al., 2021; Ripple et al., 2019; Ritchie & Roser, 2017). These are the unintended consequences of a predatory but ultimately dysfunctional worldview—based on the temporary success of a strategy of competitive exploitation of the natural world and miscalculation of its limits—that has become hegemonic and entrenched over the last 200-500 years in the era of human globalisation.

The urgency and scale of the crisis have been made very clear by an effectively unanimous consensus of international climate scientists (Ripple et al., 2017, 2019). The pending impacts of humanity's ecological ignorance that are already 'locked in' are expected to play out over a time frame of centuries and millennia (Masson-Delmotte et al., 2018), but the time frame within which we must act, to sufficiently contain the underlying anthropogenic drivers of the crisis and usefully limit their eventual cumulative effect is of the order of just decades and years, and it is rapidly shrinking. This is

the world that our young people must be equipped by their education to navigate, and for the sake of humankind, to rescue. Greta Thunberg began her first 'school strike for climate' in August 2018 when just 15 years old, sitting alone every day for three weeks outside the Swedish parliament building in the run-up to the Swedish elections (Verlie & Flynn, 2022). Greta was protesting to demand that the Swedish government adopt policies that would radically reduce the country's carbon emissions. Two months later, in a press release announcing the Masson-Delmotte et al. (2018) report for the Intergovernmental Panel for Climate Change (IPCC) on limiting global warming to 1.5°C, the authors stated that:

> Limiting global warming to 1.5°C would require "rapid and far-reaching" transitions in land, energy, industry, buildings, transport, and cities. Global net human-caused emissions of carbon dioxide (CO2) would need to fall by about 45 percent from 2010 levels by 2030, reaching 'net zero' around 2050.
>
> (p. 14)

More recent research has raised the concern that the climate models upon which the IPCC based its reports may be systematically underestimating the rate of global warming (Rantanen et al., 2022).

*Carbon Emissions have continued to rise.*

As I write these words, in June 2024, almost six years have passed since the IPCC's '45 percent by 2030' warning was issued. Far from falling 45 percent, global emissions have continued to rise (UNEP, 2023). As Carrington (2023) observes "Temperature records have already been obliterated in 2023 and intensifying heatwaves, floods and droughts have taken lives and hit livelihoods across the globe, in response to a temperature rise of 1.4C to date" (p. 1). The secretary general of the United Nations (UN), António Guterres, has repeatedly warned that the world is heading for a "hellish" future of 3°C of climate heating. The United Nations Environment Programme (UNEP) (2023) report states that global temperature rise could be limited to 2°C if all the long-term pledges by countries to cut emissions to net zero by about 2050 were to be achieved. However, it concluded that these net zero pledges "are not currently considered credible" (Carrington, 2023, p. 2). A press release from the United Nations Framework Convention on Climate Change (UNFCCC) ahead of the twenty-eighth conference of the parties to the convention, COP28, reached a similar conclusion stating:

> The latest science from the UN's Intergovernmental Panel on Climate Change indicates that greenhouse gas emissions need to be cut 43% by 2030, compared to 2019 levels. This is critical to limit temperature rise to 1.5 degrees Celsius by the end of this century.
>
> (UNFCCC, 2023, p. 1)

Note that the baseline in this statement is now 2019 compared to the 2010 baseline cited in the IPCC's 2018 warning above.

*Climate tipping points*

Adding to the concern around the effects of global warming on the habitability of the Earth for human beings and the species on which we depend is the likely existence of climate 'tipping points'—also known as 'bifurcation points' in complex system dynamics terms—with uncertain temperature and

atmospheric greenhouse gas (GHG) concentration thresholds beyond which further warming becomes self-accelerating and effectively irreversible. Lenton et al. (2023) define a tipping point as occurring;

> when change in part of a system becomes self-perpetuating beyond a threshold, leading to substantial, widespread, frequently abrupt and often irreversible impact. This definition includes the possibilities of non-abrupt and reversible tipping points.
>
> (2023, p. 9)

For Earth's biosphere, the major system tipping point lies between two alternative Stable states called the warm (W) state, like the one in which we live with temperatures around -3 to 30°C, and the snowball (SB) state, in which glaciation is global and average global surface temperatures are in the range -73° to -53°C (Lucarini & Bódai, 2020). For human beings, the most relevant climate tipping points lie above the (W) states. The loss of the Greenland Ice Sheet, for instance, " would ultimately lead to around seven metres of global sea-level rise" (Lenton et al., 2023, p. 11).

Over many millions of years, the Earth has alternated between the (W) and (SB) Stable states, driven by fluctuations in solar irradiance and the balance between positive and negative feedback mechanisms. The positive feedback of ice albedo reflection accelerates cooling as solar irradiance falls and more ice forms, or conversely, above the solar irradiance tipping point, accelerates warming as the ice disappears and more heat-absorbent dark surfaces are revealed. The main negative feedback mechanism is the Boltzmann radiation relationship for dark surfaces which dramatically reduces heat lost by radiation to space as the planet's surface cools and increases heat loss as the surface warms (Lucarini & Bódai, 2020). Other mechanisms affecting the tipping point dynamics and transition irradiance values include the atmospheric concentration of greenhouse gases and the arrangement of the continents (2020). The existence of climate tipping points is relevant not only in light of humanity's nature-disconnection but also because they illustrate tipping points and complex system dynamics in general which apply also to social phenomena.

### 2.2.3 Political dysfunction and Social tipping points

*Political conflicts of interest are the biggest obstacle to resolving the Eco-crisis.*

The direction of global political will remains insufficiently altered by science-based scenarios of pending ecological and economic collapse. This inertia does not arise from any lack of strategies and available technologies to mitigate and adapt to the eco-crisis (Jacobson, 2022). Although the proximal cause of our sustainability crisis is Nature disconnection, the greatest obstacles to effectively addressing the crisis are socio-political. As I prepare to submit this thesis in January 2025, the citizens of the United States have just inaugurated a president and a governing party, to both their Senate and Congress, who explicitly maintain that the Climate Change emergency is a hoax.

Injustices and extreme inequalities undermine societies' and nations' capacities and will to cooperate for the elimination of ecological destruction, which in turn further exacerbates existing injustices and inequities (Bolstad & Overbye, 2022). The intergenerational commitment to BaU economics established over the past two and a half centuries has also entrenched substantial political inertia. As Lenton et al. (2023) observe, the actions driving us towards generally undesirable Earth system tipping points may benefit some people in some ways while being negative for the majority—for example, through fossil fuels extraction and use. Conversely, some minorities may be adversely impacted by actions towards avoiding such tipping points—for example farmers, by policies favouring plant-based agriculture rather than ruminant livestock farming.

Within nations, those at the top in the most influential positions of government and business with the personal resources for transitioning to sustainable lifestyles are also the greatest beneficiaries of dependence on fossil fuels. In 2013, the average GHG emissions per person in the UK for instance, was 8.8t (Ritchie et al., 2023). The richest 1%, however, used 147t per person, 36 times more than the poorest 10% who were responsible for just 4t per person (Kenner, 2019). Chancel (2022) observes that inequities within countries globally are now more significant than those between countries:

> Contrary to the situation in 1990, 63% of the global inequality in individual emissions is now due to a gap between low and high emitters within countries rather than between countries.
> … the bulk of total emissions from the global top 1% of the world population comes from their investments rather than from their consumption.
>
> (Chancel, 2022, Abstract)

Individuals and families in the lower half of the socioeconomic hierarchy are, however, more often faced with choosing between a polluting high-carbon lifestyle and not putting food on the table. Talk of catastrophic climate change impacts on timescales of decades, centuries, or millennia may have little cut-through for the poorest groups. However, Chancel (2022) also notes that "While per-capita emissions of the global top 1% increased since 1990, emissions from low- and middle-income groups within rich countries declined" (Abstract). Despite these worthy improvements, effective strategies to meet global net zero emissions targets cannot rely on individual family lifestyle choices. Systemic transformation at the levels of communities, nations and globally will be required according to the Organisation for Economic Co-operation and Development (Organisation for Economic Co-operation and Development, n.d.; Zanden & Henzen, 2024).

*Inequity and Solving the Tragedy of the Commons*

In terms of humanity's collective capacity to respond to climate change and environmental degradation, inequality matters. Universal equality would be very likely impossible to achieve and probably not even optimal in terms of global sustainable wellbeing, but extreme inequality and injustices are socially destabilising and wasteful. As Piketty (2014) shows, social wealth imbalances reached historical maxima just before major social upheavals and conflicts such as the French Revolution of 1789 and the two twentieth-century world wars. While the twentieth-century global conflicts acted as abrupt corrections to concurrent unsustainable and inequitable conditions in the global economy, by the 1980s the trend toward ever-increasing inequity had resumed (Chancel et al., 2017; Piketty, 2014). The exhausting effects of inequity, however, are present and debilitating for societies long before they provoke major conflicts. For instance, Wilkinson and Pickett (2010 cited in Scott, 2012) "present income inequality statistics from 21 countries in developed market democracies to show that health and social problems are higher in more unequal societies" (p. 28).

Based on the range of studies presented in their book Baland, Bardhan, and Bowles (2007) conclude "that in many settings inequality does indeed inhibit mutually beneficial approaches to the governance of the commons" (p. 8). The mechanisms they suggest for this effect include 'pecuniary emulation' by the less wealthy of more wealthy, and more polluting social classes; the undersupply by governments of leisure-enhancing public goods like libraries which encourage less polluting activities; and the creation of what has been referred to as "sacrifice zones" (Sayre & Löwy, 2019, p. 125),

inhabited by poorer communities to which wealthy communities can export their toxic wastes, avoid its impacts, and continue or increase their own polluting activities.

Reducing inequality, particularly poverty, has significant benefits for societal wellbeing and increases the likelihood of collective measures being taken to protect the environmental commons. Cross-cultural understanding and education have also been found to increase the likelihood of pro-environmental collective action. How culture and worldviews function as the ultimate cause of, and solution to, our crisis of Sustainable Wellbeing is taken up in Section 2.2.4.

*Social and Economic Tipping points both provoke fear and provide hope*

Just as there exist ecological tipping points so also there exists the potential for complex social systems and complexes of ecological, social, and technical systems to exhibit tipping points:

> Social systems, like physical and ecological systems, can have stable states (attractors) that resist change; they can exhibit path dependency and hysteresis; they can undergo non-linear change with positive feedback; and they can cross social tipping points into new stable states, over various timescales.
>
> (Lenton et al., 2023, p. 11)

Greta Thunberg's 2018 protest outside the Swedish parliament instigated the worldwide school strike for climate protest—albeit limited to school students mainly in the large cities of affluent countries in the global north with non-authoritarian ruling regimes (Walker, 2020)—is an example of a social system experiencing such a tipping point. Other significant and unprecedented legal, political, and economic benchmarks are also continually being established and surpassed, indicating that large-scale global social transformation is gathering momentum. The first-ever climate case victory in the European Court of Human Rights was won In April 2024 by a group of older Swiss women. The court ruled that Switzerland had "failed to comply with its duties under the Convention concerning climate change" (RNZ, 2024)and that it had violated the right to respect for private and family life. "The ruling is binding and can trickle down to influence the law in 46 countries in Europe, including the UK". At the same time, exponential trends of transformation in the global mix of energy sources are apparent, away from polluting fossil fuels and toward renewables:

> Renewables generated a record 30% of global electricity in 2023, driven by growth in solar and wind. With record construction of solar and wind in 2023, a new era of falling fossil generation is imminent. 2023 was likely the pivot point, marking peak emissions in the power sector.
>
> (Wiatros-Motyka et al., 2024, p. 6)

Apart from its environmental superiority, the great social value of renewable energy sources, particularly solar, is the globally distributed and relatively low capital investment nature of the technology which makes possible not only increased energy equity but also greater overall energy system resilience (Khalid et al., 2023; O'Shaughnessy et al., 2024). This is particularly true in New Zealand. With our abundant hydropower capacity, more rooftop solar would mean that hydropower dams could be managed more effectively for energy storage and security (Poletti et al., 2024).

However, as Lenton et al. (2023) point out, social tipping point dynamics also operate in situations of social collapse or escalating conflict, where triggering events can enflame underlying tensions to a state of open warfare. Accelerating trends and tipping points apply to complex social systems as much as to ecosystems and the entanglements of the two but their ultimate effects and outcomes are finely

balanced between benign and catastrophic attractor states so that the agency of individuals and small groups can always be decisive. The challenge for a Sustainable Wellbeing Metacurriculum (SWM) is to expose students to the diversity of circumstances that communities of people are experiencing around the country and the planet concerning climate change and the sustainable wellbeing crisis and to inspire their thinking, empathy and agency around the meaning and implications of the phrase 'Just Transition'.

### 2.2.4 Worldviews, Culture and the Ultimate Cause

The agency of individuals and small groups is intimately entangled with their values, belief systems, worldviews and cultural heritage. In their research with high-level United Nations and European Commission climate policy advisors and coordinators, and parliamentarians, Wamsler and Bristow (2022) identified various ways in which habits of mind undermine pro-environmental behaviour change. 'In-group bias' for instance can lead to the 'out-grouping' or relegation of most of the natural world to sacrifice zones, as already described in earlier sections. Other cognitive distortions mentioned by their participants that make changing habits challenging and lead to "a vicious cycle of deteriorating personal and planetary wellbeing" (2022, p. 3) included:

> (i) polarised thinking (polarisation effect, confirmation bias), (ii) short-term thinking (hyperbolic discounting bias) and (iii) a tendency to blame or rely on others, and not take responsibility for action (bystander effect), all leading to a lack of agency and care.
>
> (2022, p. 6)

At the deepest level, both environmental degradation and social inequities can be traced to the dominant cultural constructs of our time. Western-style growth-oriented, anthropocentric liberal capitalism and scientific positivism have become the default global worldview, marginalising indigenous and traditional conceptions that honoured nature, human ancestral connection, and belonging to nature (whakapapa) (Eames & Mardon, 2020). Our belief that the human self is "unique and deserving with an identity distinct from, but of equal worth to, all others" (Scott, 2012, p. 21) has become integral to the free-market conception of economics dependent on exploiting nature (p. 21).

This is not to dismiss, however, the extraordinary progress our species has made over the last 200-250 years in terms of technologies, built environment development, and standards of living, in aggregate at least if not equitability, and the strengths of human nature along with its egotism that made that progress possible. As Johan Norberg (2016) observes, many measures of global wellbeing have improved dramatically in these two and half centuries including life expectancies, which have more than doubled since 1770 (Our World in Data, n.d.), the proportion of people living in poverty which has fallen from around 90% to just 10% (Bourguignon & Morrisson, 2002, p. 731; Cruz et al., 2015, p. 8), and illiteracy which has fallen by the same proportions (Organisation for Economic Co-operation and Development, 2014, p. 92). The incidence of violence within states and the lethal consequences of wars among them have also trended downward over time (Norberg, 2016).

In 2022, Norberg, who was a senior fellow at the Cato Institute—a Washington DC-based libertarian think tank (Cato Institute, 2024)—explained in an interview that he sees innovation and political freedom as the fundamental drivers of our modern age of progress:

> The major change [in the eighteenth century] was that, for the first time, we had a sufficiently big crack in the wall—the old centralized mercantilist economy run by nobles and kings who decided who did what and restricted production and

> trade. Lots of creativity began to pass through that crack and change everything, from the dramatic—steam engines, textile manufacturing, modern infrastructure, steamboats, cars, and planes—to the everyday.
>
> (Walker-Werth & Walker-Werth, 2022, p. 87)

The difference, however, between the freedom to innovate for the benefit of Self and Society, and the freedom to exploit society and nature for the benefit of the innovator, is a distinction that Norberg (2016) doesn't appear to make. In his chapter on world progress in environmental standards, he cites examples of improvements such as the management of pollution in London since the Great Smog of 1952 and air pollution reductions in the United Kingdom since 1970. All examples he uses are associated with the mitigation of the initial detrimental impacts of industrialization. Such is his belief in the power of human creativity to solve any problem that he writes "Today, it seems like technology and affluence are not an obstacle to environmental sustainability, but rather its precondition" (2016, p. 113). Expanding our historical horizon back beyond the modern industrial era, the more relevant question begged by the dramatic improvement of wellbeing statistics over the last 250 years may not be, 'How was it achieved?', but rather "How did things ever get so bad?"

Contrary to the traditional view suggested by Norberg (2016), that the life of early hunter-gatherer peoples before the dawn of the agrarian revolution some 12,000 years ago was nasty, brutish and short, Gurven & Kaplan (2007), concluded from their cross-cultural study that "extensive longevity appears to be a novel feature of Homo sapiens" (p. 349). Their "data show that modal adult life span [was] 68–78 years, and that it was not uncommon for individuals to reach these ages" (p. 349). The relative importance of aggression and competition versus nonaggression and cooperation in the lives of hunter-gatherers has also been long debated in the literature. In his recent interdisciplinary study, Lee (2018) argues that "cooperative breeding and child-rearing, as well as management of conflict, flexible land tenure, and balanced gender relations" (Abstract), have been central to human evolution. How can we explain then the apparent capitulation to modernity of the hunter-gatherers—including the ancestors of many Indigenous peoples still dealing with Western European colonialism in the 21st century—to the erosion of their relatively healthy lifestyles sustained over many tens of thousands of years? The onset of rapid climate change in earlier epochs has been suggested as generating socio-environmental tipping points forcing the adoption of farming, which through its productivity led to population growth and a cycle of ever more children to labour on farms and greater dependency Slowly accelerating population growth itself may also have been an increasingly important factor leading to imperialism, colonisation and the aggregation of tribes into nations for greater security.

Return to a pre-agrarian era of hunter-gatherer lifestyle wellbeing when the world population was just 4 million (Suzman, 2020, as cited in Anthony, 2021), is not an option in a world of more than 8 billion human beings. However, the wisdom contained in those lifestyles in terms of sustainable human relationships with the natural world and one another remains embedded in many living Indigenous cultures. At the same time, techno-overly optimistic solutions to our Eco-crisis need to be seen for the unhelpful magical thinking they are. Undoubtedly technology and innovation will play a decisive role in meeting human survival and wellbeing challenges in the Anthropocene, but not by doubling down on Business as Unsustainable, discounting the scientific consensus on Climate Change risks and waiting for science and innovation to solve the problem. A favourite refuge of hope for techno-optimists is Carbon Capture and Storage (CCS) (Harvey et al., 2019; Morrison, 2024; Schlanger, 2024). Sober economic and scientific research is less sanguine. "$CO_2$ utilization is not an end in itself, and these pathways solely or even collectively will not provide a key solution to climate change" (Hepburn et al., 2019, p. 95). '$CO_2$ utilization' here refers to various technologies that remove $CO_2$ directly from the emissions of industrial processes or the atmosphere including not just CCS but also biological or land-

based forms of $CO_2$ utilization such as farming and forestry. According to Morrison (2024), the true cost of a CCS industry capable of making any serious contribution to the current total of energy-related $CO_2$ emissions each year is infeasibly great. He concludes:

> The promotion of CCS by the fossil fuel sector aims to maintain business as usual, not to reduce [the] production of oil and gas, meaning emissions of this scale will continue into the future. A cheaper option to reduce emissions is to move to cleaner forms of energy production.
>
> (p. 4)

It is of existential significance for humankind, I argue, that today's secondary school students have the opportunity to be aware of, and critically examine, the full range of worldviews relevant to their sustainable wellbeing and that of their descendants. Not only are they at the age when personal life values are first being formed and career paths are chosen, but they are facing what may prove to be the pivotal decade of opportunity for any generation to maximise human agency for a sustainable future.

### 2.2.5 The Role of Education and Schools

Education and educational leadership have an essential role to play in moving society from vicious toward virtuous cycles of thinking (Wamsler & Bristow, 2022) which reinforce behaviour, dispositions, and worldviews that address the eco-crisis, climate change, and sustainable wellbeing (Bolstad, 2023; Eames & Bolstad, 2023; Everth et al., 2021a; Everth & Bright, 2022). The potential for education to leverage an effective societal response to the Anthropocene Eco-crisis is however under-appreciated by academics, scientists and policy-makers outside of education (Eames & Bolstad, 2023; Everth et al., 2021a). On the time scale of years and decades, that we are now facing, primary and secondary school education may arguably have more effect on society's effective response to the crisis than attempting to persuade adults who are already committed to unsustainable livelihoods and lifestyles.

Education for Sustainability and Wellbeing is intrinsically cross-curricular and holistic. In nurturing positive behavioural change for Sustainability and Wellbeing, the interaction between culture and cognition on one hand, and nature and socio-emotional connectedness on the other, is two-way. New actions and experiences lead to new beliefs and narratives about what is possible. New beliefs lead to innovation and further exploration. Both processes are mediated and reaffirmed by socio-emotional competencies. Wamsler and Bristow (2022) stress the importance of the 'whole school' approach for Education for Sustainability (EfS) in reinforcing this virtuous positive feedback cycle between action and belief systems and make the following recommendations (including a quotation from one of their participants):

> Measures include, for instance, the revision of school curricula, the integration of caring for the environment in the school's culture/values, the involvement of the surrounding community in local projects and the revision of related national regulations and policies. The latter could ensure that learning for sustainability is made a legal entitlement for every school child, including outdoor learning as a regular and progressive part of the education.
>
> (Wamsler & Bristow, 2022, p. 15)

While the present study fully supports the recommendations of these authors it also recognises that secondary school education in its final three years necessarily requires students to make future career-oriented Subject-Based specialisation choices. Specialisation is not only productive for the collective needs of society—in terms of the diversity of skills required to sustain a complex and adaptive economy—it also motivates students' learning by catering to their particular interests and strengths. This research project aimed to provide greater detail and deeper insights into exactly what an educational response to the Eco-crisis might look like for senior secondary students in Aotearoa New Zealand, which provides both sustainable wellbeing education as a core requirement and the opportunity to pursue specialised career paths. Central to this response is the co-construction, with my teacher research participants, of a Sustainable Wellbeing Metacurriculum (SWM) framework based on complex adaptive systems theory. The following section introduces the key ideas from complexity theory that inspired my 'minimal SWM framework' starting point but also informed the interpretation of my participants' views on what enables successful Sustainable Wellbeing (SW) education implementation in schools and communities when viewed as complex adaptive systems.

## 2.3 Complex Adaptive Systems

### 2.3.1 Wicked problems and complexity

The challenges ahead of us are global, multi-dimensional and complex (Armstrong et al., 2016). In writing about the difficulty of defining and measuring sustainability in practical terms, Shephard (2020, p. 7) describes the problems involved as 'wicked'. Wicked problems have no simple solutions. Solving one aspect of a wicked problem generally makes another aspect worse. Wicked problems cannot be solved using simple or even complicated mathematical solutions, partly because they involve systems that span multiple domains: environmental, social, and cultural, and systems contain and are contained within other systems. "They can only be addressed with 'clumsy' solutions, and this involves bringing together disparate perspectives on the problem" (Bolstad, 2011, p. 7). Bringing together disparate perspectives is exactly what complexity thinking leads us to do and for this reason, complex systems thinking is a foundational theoretical orientation for this research project in the hope of finding pathways to less clumsy solutions. The central focus of my research is secondary schools and their educational purpose as realised through their enacted curricula. Schools and their curricula can be understood as complex physical, social, and cultural systems, embedded within larger complex systems. Schools are collectives of individuals. They exist within communities, within nations and at the most relevant level for this research, within the Earth's biosphere.

### 2.3.2 The Planetary System of Systems

Valuing Sustainable Wellbeing brings us inevitably to acknowledge the interrelated, joined-up nature of all things relevant to the human condition. The COVID-19 pandemic that impacted all human societies globally in 2020-21 and that continues to reverberate in economies around the world, emphatically demonstrates the systemic entanglement of our relationship with Nature, Social Justice, and Cultural perspectives on human nature. The pandemic has called our attention to the planet as a whole (Hipkins, 2021, p. 4), as the System of greatest relevance for human Sustainable Wellbeing.

Clark et al. (2017, cited in Hipkins, 2021) describe 'Systems Thinking' as: "a way of perceiving the world that:

- recognises systems as being comprised of and exhibiting properties that result from dynamic interacting parts
- incorporates a refined understanding of levels of cause and effect, including indirect as well as direct consequences and relationships between parts, and
- situates the systems thinker within the systems they are studying." (p. 10)

Recognising and managing the complementary relationship between whole and parts is critical to systems thinking. Understanding the whole planet as the system most relevant to our collective and individual wellbeing achieves, I argue, the right balance of realism and ambition. The planetary upper atmospheric boundary with near space recognises the current limits of human technological and engineering capability, for the vast majority of people. We may eventually send explorers to Mars and beyond but we cannot influence Earth's astronomical fate. Earth system thinking also corrects for the deeply embedded Western cultural tendency of treating the planet's myriad subsystems which we do have the capacity to influence and transform—including the biosphere and all our social structures and cultural expressions—as independently functioning, siloed jurisdictions. Shephard (2020) suggests that perhaps sustainability "as a destination, or a product, is only truly knowable on a planetary basis" (p. 9).

The parallel emergence of dynamical systems theory in the sciences (Hipkins, 2021) and complexity thinking in the social sciences and humanities over the last two centuries provides a theoretical foundation for the concept of a Metacurriculum for Sustainable Wellbeing not only concerning the curriculum itself but also for teachers as agents of transformation and schools as grounded complex dynamic social structures.

### 2.3.3 Complex Systems Theory and Thinking

The categorisation of systems as simple, complicated, or complex, is a useful entry point to the understanding of complexity theory. One of the earliest writers to differentiate between simple and complex systems was the physicist and information scientist Warren Weaver (Davis & Sumara, 2006). Weaver identified three types of systems—based on the type of scientific inquiry used to investigate them—which he named simple, disorganised complexity, and organised complexity (Haggis, 2008).

Weaver (1948) characterised *simple systems* as comprised of inert objects that behave in highly predictable ways and are amenable to investigation through classical physics. Billiard ball collisions, ballistic trajectories, and the rotation of rigid objects are examples of simple phenomena. He contrasted simple systems with *disorganised complexit*y—systems that are also well governed by the deterministic laws of physics but involve so many interacting variables they can only be investigated scientifically with statistical mechanics and probabilistic methods. These systems include phenomena such as thermodynamics, magnetism, molecular interactions, and population projections. *Organised complexity*, describes a class of phenomena lying between these two extremes which also involve a multitude of variables but with the essential difference that these variables are all interrelated and coherently organised. While Weaver's concept of organised complexity accords with current characterisations of complex systems, his concept of disorganised complexity is somewhat different from a category of systems that came to be described as complicated.

Paul Cilliers describes machines as *complicated systems* because the function of all their parts can be explained (Cilliers, 1998; cited in Haggis, 2008). Bloom (2016, p. 32) likewise describes human

mechanical and social artefacts such as bicycles, engines, computers and assessment and financial systems, as *complicated*. Simple and complicated systems, for Bloom, can be understood in terms of their separate parts and predictable behaviours, even if they comprise a great number of parts. Complicated systems can be entirely disassembled and reassembled and still function as originally intended (Byrne & Callaghan, 2022, p. 12). Living organisms and ecosystems, by contrast, exemplify complex systems. Their parts cannot all be named nor can their processes all be tracked and explained. Birds and frogs are complex systems. They cannot be deconstructed and successfully reconstructed and their nature cannot be understood outside of the complex system, the forest, of which they are integral components.

Complex systems, as distinct from complicated systems, are in their essential characteristics, irreducible to any formula, because of the non-linear nature of their interactions and the distributed pattern of those interactions (Osberg et al., 2008). Every complex system is unique. Traditional scientific positivism has used machine metaphors to help 'explain' reality. The metaphors 'work' by simplifying and leaving out aspects of reality to achieve formulaic predictability within their limited schema. While complexity theory specifically rejects linear, reductionist, mechanistic positivism as the only basis of knowledge (J. W. Bloom, 2016), it does not reject explanation and causality per se (Cochran-Smith et al., 2014). Of special significance to the application of complexity theory to education is the observation that the rules governing the behaviour of complex systems can change over time, i.e. they self-organise, adapt, and learn. It is the capacity for learning according to Davis and Sumara (2006) that above all characterises complex systems. The term Complex Adaptive System (CAS) which emerged with the establishment of the transdisciplinary Santa Fe Institute in the early 1980s, neatly captures this essential quality of complex systems.

Machines, no matter how complicated, are 'Closed Systems'. In the absence of new inputs, they gradually run down and cease working. *Complex systems*, by contrast, are 'Open Systems' that continually take in energy, and remain out of equilibrium with their surroundings (Gilbert, 2019, p. 263). While still subject to physical laws, complex systems exhibit behaviours that are essentially unpredictable by any means. Referring to Chaos theory—a precursor and version of complexity theory (Olssen, 2008), Gleick (1987, cited in Alhadeff-Jones, 2008), described complex behaviour as so unpredictable as to be indistinguishable from a random process, even though it may be deterministic in a mathematical sense. This interpretation of complexity brings us to a further critical distinction in the field of complex systems analysis, that between computer-based mathematical models of complex behaviour and living Complex Adaptive Systems.

Byrne and Callaghan (2022) following Morin (2007), use the terms Restricted and General complexity to clarify this vital ontological and epistemological distinction. Restricted complexity refers to reductionist mathematical simulations of complexity such as chaos theory, fractals, strange attractors, and agent-based modelling, behaviour emerging from the rules-based systems of dynamical equations or the interaction of simple agents—ie. "micro-emergence" (2022, p. 12). By contrast:

> The world of General complexity is composed of complex systems which are not just the product of simple interactions but have properties which are not to be understood in those terms and have to be addressed as real in and of themselves.
>
> (Byrne & Callaghan, 2022, p. 12)

> In opposition to reduction, [General] complexity requires that one tries to comprehend the relations between the whole and the parts. The knowledge of the

> parts is not enough, the knowledge of the whole as a whole is not enough, if one ignores its parts; one is thus brought to make a come and go [in a] loop to gather the knowledge of the whole and its parts. Thus, the principle of reduction is substituted by a principle that conceives the relation of whole-part mutual implication.
>
> (Morin, 2007, p. 10)

General complexity, in other words, refers to the reality of existence that inspires all sciences, arts and philosophies; infinite, irreducible, and eternally mysterious. The Framework for a Sustainable Wellbeing Metacurriculum (SWM) that I have developed through co-construction with my participants in this research project has a theoretical fractal structure which is an application of Restricted Complexity. Its use in actual programmes and course design by teachers for and with students, however, must be understood as a living process of General Complexity as are the schools and communities that the metacurriculum is intended to serve.

The capacity for self-organisation could be described as the signature distinction between Complex adaptive systems and those categorised as complicated or just simple. The key aspects of complex systems structure and behaviour I have found most relevant to the social and educational transformation which is the primary focus of this thesis include Self-organisation, Attractors and Phase shifts; Enabling Constraints; Self-similarity and Fractals; and Social Networks. In the following two sections, I discuss the first two topics under the heading 'Complex Behaviour' and the second two under the heading 'Complex Structure'. Although Complex Behaviour and Complex Structure are always, in reality, present together, I use them for distinct analogical purposes in this thesis. I employ the behavioural characteristics of complex systems to illustrate the SWM as an Emergent configuration of the Education System Attractor—or 'SWM Attractor' for brevity—that underlies my main research question.

This optimistic analogy pictures transformation occurring in our secondary school and tertiary education systems in response to Climate Change and the Sustainable Wellbeing Crisis which is analogous to the phase shift of a complex adaptive system attractor adapting to changing external conditions. The education system in this country—and possibly globally—I argue is in the early stages of transitioning from its traditional Business as Unsustainable (BaU) industrialization era configuration toward a Sustainable Wellbeing (SW)-centred Anthropocene configuration. This phase shift could be brought to a crucial tipping point through some critical mass of secondary schools adopting a coherent, co-constructed Sustainable Wellbeing Metacurriculum (SWM) through to year 13.

I employ Complex theoretical Structures, specifically the Lorenz Strange Attractor, the Sierpinski Triangle Fractal, and ideas from complex network theory, to illustrate how a Metacurriculum, centred on Sustainable Wellbeing, that incorporates the complementary strengths of both Cross-Curricular Holistic (CCH) and Subject-Based Specialist (SBS) modes of pedagogy, can be co-constructed—to catalyze a BaU to SWM Phase shift that is already underway—and how it could support and be supported by modifying existing teacher collegial relationship structures in secondary schools.

## 2.3.4 Complex behaviour

### *2.3.4.1 Self-organisation and Emergence*

The terms self-organisation and emergence are often used in tandem to characterise complex systems.

> Self-organization is also known as emergence and, of the many insights of complexity science, it is simultaneously the most important and the most difficult to appreciate. Somehow, agents that need not have much in common much less be oriented by a common goal—can join into collectives that seem to have clear purposes.
>
> (Davis & Sumara, 2006, p. 81).

Olssen (2008) describes an emergent property as "a property that is constituted due to the combination of elements in a system. As such it is a property possessed by the system but not by its components" (p. 103). Such systems are not in equilibrium because they are constantly changing as a consequence of the interaction between system and environment, and, as well as being influenced by external factors, they are influenced by their history.

### *2.3.4.2 Strange attractors*

*The Lorenz Attractor*

Self-organisation is also understood in complexity theory as the convergence of a system upon and continuation within a region of its space of possible states and trajectories called a 'strange attractor'. The origins of the phrase 'strange Attractor go back to a 1971 paper by D. Ruelle and F. Takens on the mathematics of turbulent fluid motion. The authors didn't explain why the attractor was 'strange' and the term eventually came to mean that system trajectories converging on the attractor are extremely sensitive to the point from which they start, i.e. the initial conditions of the system (Viana, 2000).

The Lorenz Attractor is possibly the most famous example of a restricted complexity model being used as a visual metaphor for complex systems' behaviour and managed systems transformation (Hipkins, 2022). The model appeared in an article published in 1963 by Edward Lorenz, a meteorologist at MIT, who was interested in long-range weather forecasting. His was one of the earliest attempts at weather prediction using computerised evaluation of equations governing the atmosphere's evolution. Lorenz's model can be manipulated using just three parameters $\sigma\ (sigma), r\ (rho), and\ b\ (beta)$ in the following three differential functions of time (Christersson, 2015):

$$\begin{cases} \dfrac{dx}{dt} = -\sigma x + \sigma y \\ \dfrac{dy}{dt} = -xz + rx - y \\ \dfrac{dz}{dt} = xy - bz \end{cases}$$

The sensitivity of the evolution of this system to its Initial condition demonstrated the impossibility of long-range weather forecasting. This sensitivity is also known as the 'butterfly effect' referring both to the difference the flap of a butterfly wing could potentially make to a long-term weather forecast and to the form of the Lorenz Attractor itself, with its two distinctive 'basins of attraction'.

The three-dimensional Lorenz attractor is useful as a metaphor for Educational systemic change processes in that it can model the difference between intrinsic Alternative Stable States of an Attractor—i.e. basins of attraction—and Phase shifts of the system attractor as a whole in adaptation to environmental forcing (Dudgeon et al., 2022). The distinction depends critically on where the system boundary is drawn and the concept of tipping points applies to both. These two types of attractor dynamics are illustrated in Figure 2-1 and Figure 2-2 using two different forms of the Lorenz attractor each seen from two perpendicular points of view.

*Figure 2-1 An SWM-like Configuration of the 'Education System Attractor'*
*The three-dimensional Lorenz Attractor as seen from two perpendicular points of view: (σ,r,b)= (10,28,2.5)*

A B

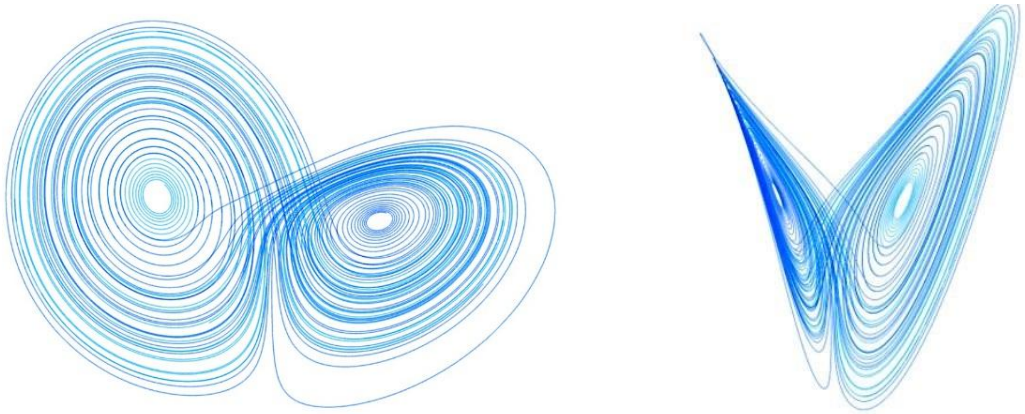

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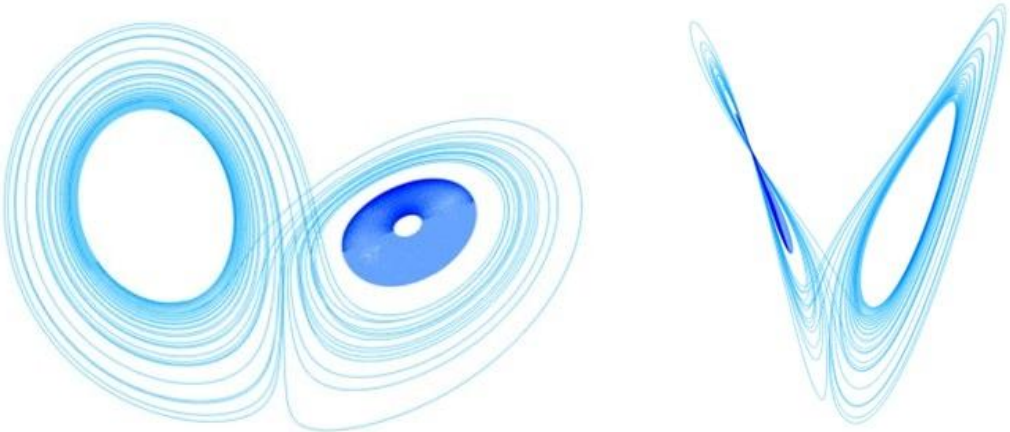
*Figure 2-2 A BaU-like Configuration of the 'Education System Attractor'*
*The three-dimensional Lorenz Attractor seen from two perpendicular points of view: (σ, r, b)= (7, 23.5, 2.9)*

A B



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The Alternative Stable States change process is present in both figures as the traces of two moving points along trajectories cycling between one basin of attraction and the other. The Phase shift process—modelled by adjusting the Lorenz system parameters $\sigma, r, and\ b$—is represented by the change in the overall form or configuration of the attractor apparent between Figure 2-1 and Figure 2-2.

In this interpretation, the Attractor is both a dynamic system of alternative (relatively) Stable States in the form of basins of attraction and at the same time a component of larger systems which keep its form evolving under the influence of alternative potential Attractor configurations.

The two curving lines, coloured light and dark blue, show the trajectories of two moving points, that may be arbitrarily close initially, but which will inevitably diverge unpredictably while nevertheless remaining within the overall well-defined form of the attractor. The system is fully deterministic in that a particular starting point will always give rise to the same trajectory on machines using the same degree of digital precision. A trajectory will typically complete one to many orbits of one basin spiralling outwards until it reaches a bifurcation point between the basins from where it will transition over in toward the centre of the other basin. A particular trajectory will never intersect with itself and a cross-section through the attractor reveals a fractal pattern of points—of which more is said in Section 2.3.4.3—created by the successive intersections of the trajectory with that cross-sectional plane (Feldman, 2019).

In the social reality of general complexity which is not digitally deterministic, however, the moving points could be individuals with the agency to affect the trajectories they follow to some degree and collectively to influence how the whole Attractor configuration evolves from within.

*Bifurcations and Phase-Shifts*

Using the language of complexity theory analogically, Gilead and Dishon (2022) describe high-stakes testing regimes like the Programme for International Student Assessment (PISA) as an example of a shaping Attractor for Educational systems worldwide. In terms of the Lorenz attractor analogy, PISA might represent one basin of attraction—the one on the right of Figure 2-1A and Figure 2-2A, say—and New Zealand's National Certificate of Educational Achievement (NCEA), the other. Schools in New Zealand move under the influence of both but our PISA results influence the form of our NCEA system in ways that NCEA cannot influence the international programme. Figure 2-1 represents a system state where all schools alternate their focus between NCEA and PISA. Figure 2-2 represents a system state where there exist schools that alternate their focus as in Figure 2-1 between NCEA and PISA but also schools, like the point following the dark blue trajectory, that are locked into focusing only on the PISA basin of attraction.

A transition of the attractor from Figure 2-2 to Figure 2-1, however, would represent a fundamental change in both assessment systems called a Phase-Shift. For example, the planned introduction of items within the PISA 2025 Science Assessment for 15-year-old students which will measure essential competencies that underpin the concept of agency in the Anthropocene (White et al., 2023) is a phase shift in terms of the Strange Attractor analogy being driven by an increasing wider cultural acceptance of the Anthropocene concept. Again it should be noted that in applying the Restricted Complexity of the Lorenz Attractor as a metaphor for the General Complexity of actual schools and testing regimes we are not modelling the system agency present in the latter. The distinction between bifurcation alternative Steady State transitions and phase shifts helps us understand and work with schools as complex systems. As Byrne and Callaghan (2022) recommend:

> We need to explore sections of the trajectory where things stay much the same—remain in the same attractor—for a relatively long period, and those where the trajectory describes a period of qualitative change, a phase shift, a move to a new attractor in the possibility space.
>
> (2022, p. 145)

In climatic earth system terms, bifurcation is analogous to the periodic alternation of the El Niño and La Niña states of the South Pacific Ocean currents called the "El Niño and the Southern Oscillation (ENSO)" (National Oceanic and Atmospheric Administration, 2024). ENSO has been described as being governed by a stable rhythmic Attractor with three frequencies in resonance (2.5, 5.0 and 65 years) which Bruun et al. (2017) call the "Heartbeat of the Southern Oscillation" (p. 6746). Phase shift, on the other hand, is analogous to the more dramatic change described in Section 2.2.2 as the biospheric transition between Earth's snowball (SB) and warm (W) states driven by external solar forcing. In Educational system terms, the ideological changes which routinely take place in education policy at a change of government, from left to right-leaning, can be likened to bifurcation. The change I'm suggesting and exploring through this thesis, from the established BaU curriculum to a Sustainable Wellbeing centred Metacurriculm, is a transformation analogous to phase shift.

*Socio-Cultural Attractors*

In socio-cultural systems, a sufficiently convincing, well-communicated and timely vision can function as a catalyst for the emergence of an immanent attractor that can act as a more adaptive alternative to the attractor currently organising the system (Gilead & Dishon, 2022, p. 829). From his work with cultures of collaborative learning, Fullan (2016, p. 544) describes strange attractors as "forces that cause things to coalesce". For Fullan, the attractors in collaborative learning are human social tendencies that can bring purposeful learning to converge on good solutions. Morrison (2008, p. 25) describes a 'strange attractor' as "a specific topic or centre of interest" that serves to focus the self-organisation of a social web or ecosystem. Histories of intellectual ideas also can be thought of as self-organising, where the ideas and hunches of a critical mass of autonomous individuals coalesce into a new way of looking at the world, (Kuhn, 2008). Using a vision to nudge systems in a desired direction has been recognized as an effective strategy (Shenhar & Holzman, 2017).

As explained in Section 2.3.3, the analogy of the Sustainable Wellbeing Metacurriculum as an Emergent configuration of the Education System Attractor—or 'SWM Attractor' analogy—underlies my research questions. In Section 3.2.3, I describe how the inspiring vision interpretation of the attractor concept is central to my methodology and in Section 3.2.3 how it influenced my research design.

### *2.3.4.3 Conditions that facilitate transformative change*

This research project explores what Davis and Sumara describe as the principal concern of transformative education, i.e. "the conditions for the emergence of the as-yet unimagined" (Davis & Sumara, 2009, p. 38). They list three conditions of social collectivities, presented as complementary pairs, that facilitate transformative change.

- Specialization—living the tension of diversity and redundancy,
- Trans-level learning—enabling neighbour interactions through decentralized control, and

- Enabling constraints—balancing randomness and coherence.

(Davis & Sumara, 2006, p. 136)

All three are relevant to resolving the central tension for secondary schools concerning an SWM; that is, how to include a core compulsory cross-curricular element centred on Sustainable Wellbeing as an emerging transdisciplinary discipline, and also cater to the traditional Subject specialisation interests and ambitions of students. I use the phrase 'transdisciplinary discipline' here—where something like 'transdisciplinary learning focus' might have been expected—to avoid the impression that the transdisciplinarity intended is to be student-led—a trend labelled as the "learnification" of education by Biesta (2015, p. 5)—rather than guided by teachers with, or developing, expertise in the disciplined exploration of Sustainable Wellbeing issues and projects.

For Davis and Sumara (2006, p. 140) "specialization entails a balancing of individual obsession and collective necessity-that is, a balancing of internal diversity and internal redundancy". Requiring all teachers to be involved in Sustainable Wellbeing education would place a higher value on their holistic pedagogical expertise and broad Sustainable Wellbeing knowledge and skills. This would increase professional redundancy within the teaching staff as a whole but improve the resilience of the whole school curriculum through the teachers' increased sharing of a common conceptual framework and vocabulary. At the same time, maintaining a diverse range of subject specialist teaching knowledge in the collegium improves the potential responsiveness of the whole school curriculum to the rapidly evolving needs of their supporting communities in the Anthropocene.

The 'neighbour' interactions referred to in trans-level learning, include not only personal and group interactions but even more significantly the ideas, questions, and representations that people share. The ideational-creative network "rides atop the social network" (Davis & Sumara, 2006, p. 140) and they are not the same thing. In complex social entities, not only individuals learn but also the group can develop a shared knowing that transcends the sum of the individuals' knowledge like musicians or teams playing as an ensemble on the 'same wavelength'. 'Sharing' in this sense is a "synonym for 'decentralised'" (p. 145). For 'neighbour' interactions to reach a density sufficient for this sort of learning experience to occur, leadership must become contextually fluid and situationally transferable. Authority becomes consensual within the group and the role of external authorities is to "merely condition or occasion possibilities" (p. 145) rather than impose them. Within secondary schools, such conditions could include the permanent provision within the students' timetable for cross-curricular holistic Sustainable Wellbeing lessons designed and taught by trans-disciplinary teaching teams.

Finally, the phrase 'enabling constraints'. :

> … refers to the structural conditions that help to determine the balance between sources of coherence that allow a collective to maintain a focus of purpose/identity and sources of disruption and randomness that compel the collective to constantly adjust and adapt. (Davis & Sumara, 2006, p. 147)

Living complex, adaptive systems inhabit the 'Goldilocks' zone between death by rigid ossification and death by chaotic disintegration. As Davis and Sumara (2006) describe:

> Complex emergence happens 'on the edge'; where new ideas and innovative genotypes are forever nibbling away at the edges of the status quo, and where even the most entrenched old guard will eventually be overthrown ... [in] the constantly shifting ... zone between stagnation and anarchy ... where a complex system can be spontaneous, adaptive, and alive.

(Waldrop, 1992 as cited by Davis & Sumara, 2006, p. 136)

## 2.3.5 Complex structure

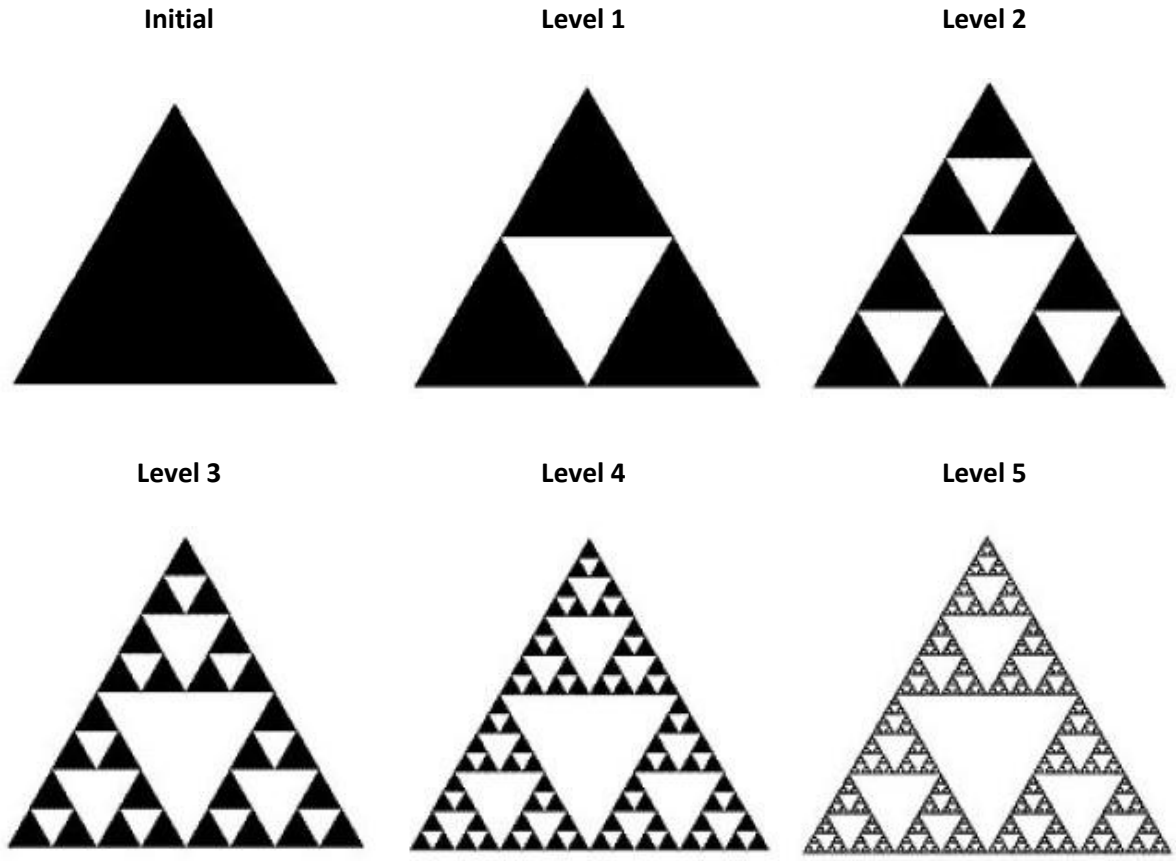
### *2.3.5.1 Fractals and Self-similarity*

Complex systems display not only self-organization and emergence but also a tendency to contain and be nested within (arising from and giving rise to) other complex systems (Davis & Sumara, 2009). This nestedness and overlapping of levels of organisation are recognised properties of biological systems. From biomolecules in aqueous solution up to the global ecosystem itself the various levels of structure function as a seamless whole simultaneously and complementarily (Theise & Kafatos, 2013). The definition of the system then depends on the scale of observation. The level of observational chosen is inherently, irreducibly coupled to our observations of biological systems (Davis & Sumara, 2010; Theise & Kafatos, 2013). Furthermore, the nested levels of complex biological systems cannot be reduced to one another even when there are deep structural similarities at different levels, as new rules apply at each level (Davis & Sumara, 2006).

Complex social systems have been described as nested structures by various authors (Ettekal & Mahoney, 2017; Napal et al., 2020). Neal and Neal (2013) maintain that 'networked' is a more appropriate descriptor for social structures in our highly connected and mobile twenty-first-century global society. Scale-free networks (Davis & Sumara, 2006; Harré & Prokopenko, 2016; Widlok & Cruz, 2022) offer a theoretical tool that can model both the large-scale nested hierarchical levels and the small-scale dynamic rhizomatic nature of actual human societies. The present section introduces fractal self-similar nested structures and in the following section, I explore social network theory and its implications for teacher-professional relationships in schools wanting to implement transformative approaches to education such as this Sustainable Wellbeing metacurriculum.

The concept of fractal self-similarity is a mathematical representation of a particular form of nested complexity which first gained widespread recognition through the work of Benoit Mandelbrot (1982) and his striking computer-generated fractal geometric images. A fractal is a complex theoretically infinite, recursively constructed shape, such that a magnification of a part of one region of the form can be closely matched with some other region at higher or lower magnification (Alhadeff-Jones, 2008). That is, the parts resemble the whole. The self-similar, nested, qualities of fractal forms can be described as scale-free (Davis & Sumara, 2006). The Sierpinski triangle is an example of a simple scale-free fractal form. Figure 2-3 shows the initial form and first five levels in the recursive process of creating a Sierpinski triangle.

*Figure 2-3 The starting triangle and first five levels in the process of creating the Sierpinski triangle*




Fractal geometry is only a mathematical analogy to natural forms and to human social and cultural phenomena which demonstrate metamorphosing self-similarity over a finite range of scale levels, even though their structures are embedded in a physical universe with no clear lower or upper bounds to its nested levels of organisation. The fern leaf shown in Figure 2-4 is a typical example of a self-similar structure in plants.

*Figure 2-4 The whole fern leaf with its fractal substructure and the unfurling fronds [inset]*

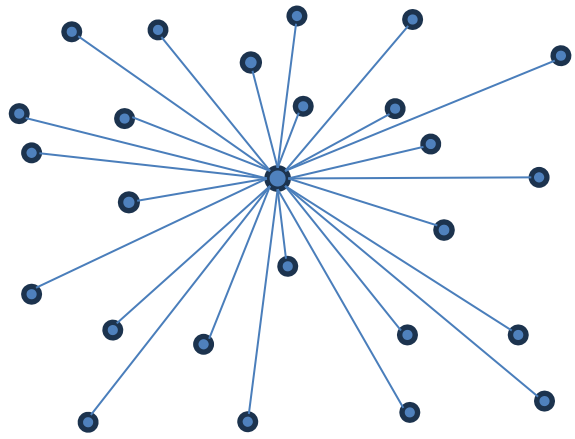
### *2.3.5.2 Social Networks*

Network theory is a branch of complexity research which offers valuable principles for describing complex structures and dynamics, relevant to human social (and logistical) networks and I argue, for transforming the structure of teachers' professional relationships in ways that will foster both their cross-curricular pedagogical expertise in Sustainable Wellbeing and also their traditional subject-based specialities. As I explore further in Section 2.5, teachers' professional relationships in most secondary schools remain dominated by hierarchical subject-based authoritarian structures. The alternative form of professional social networking, Dynamic Egalitarian structures, also naturally arise, especially in smaller schools, but they are generally not formally and systematically applied to the curriculum and lesson timetable and their potential to foster innovative cross-curricular education for Climate Change, Sustainability and Wellbeing is thus untapped.

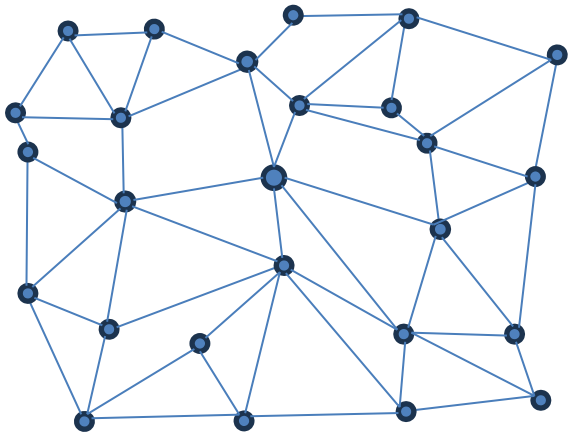
Davis and Sumara (2006), describe three basic forms of network architectures: centralized, scale-free (decentralized, fractal-like) and distributed, as illustrated in Figure 2-5.

*Figure 2-5 Four types of network architectures. Source: Davis and Sumara (2006)*

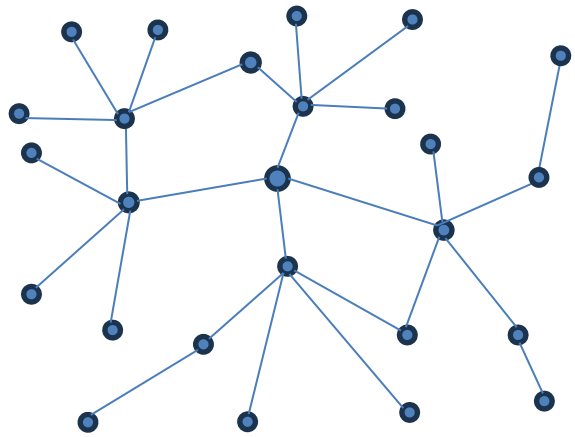
A: Centralised



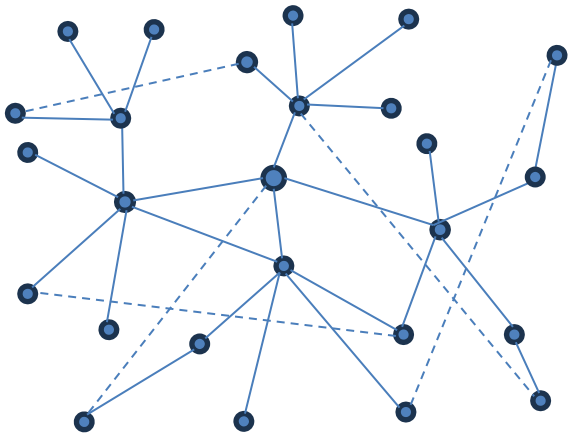
B: Distributed



C: Scale Free



D: Scale-free with a Few Weak Links



Centralized systems have highly efficient information flow because their nodes (or agents) can, in principle, be separated by just one other linking node. The network is, however, at risk of system-wide collapse if the central node fails. A distributed, mesh-like system by contrast can be extremely resilient, although much less efficient at moving information and resources. The decentralized or scale-free network, typical of complex systems, balances efficient communications with resilience. Although sections of the network can become isolated if key nodes fail, this vulnerability can be minimised by building in a few additional distributed 'weak links'. Improving the flow of information in the network can boost the adaptive intelligence of the system (p. 52). Attention to the dynamics of professional networks in organisations such as schools could thus be critical to understanding their relative willingness or resistance to transformative change.

Complex scale-free network-like phenomena are also often seen to be interpenetrating. Distinct but intimately entangled networks can and do exist in the same 'spaces'. For example, the object-subject relationship between one's neural system and one's conceptual framework can both be understood in terms of decentralized networks, but neither can be reduced to the other (Davis & Sumara, 2006). The natural world is full of intertwined fractal structures such as the lung with its bronchi, various bronchioles, and alveoli (Stanley & Young, 2011), with the fractally elaborated network of blood vessels in a way that maximises the area of intimate association between the two networks for the efficient exchange of $O_2$ and $CO_2$.

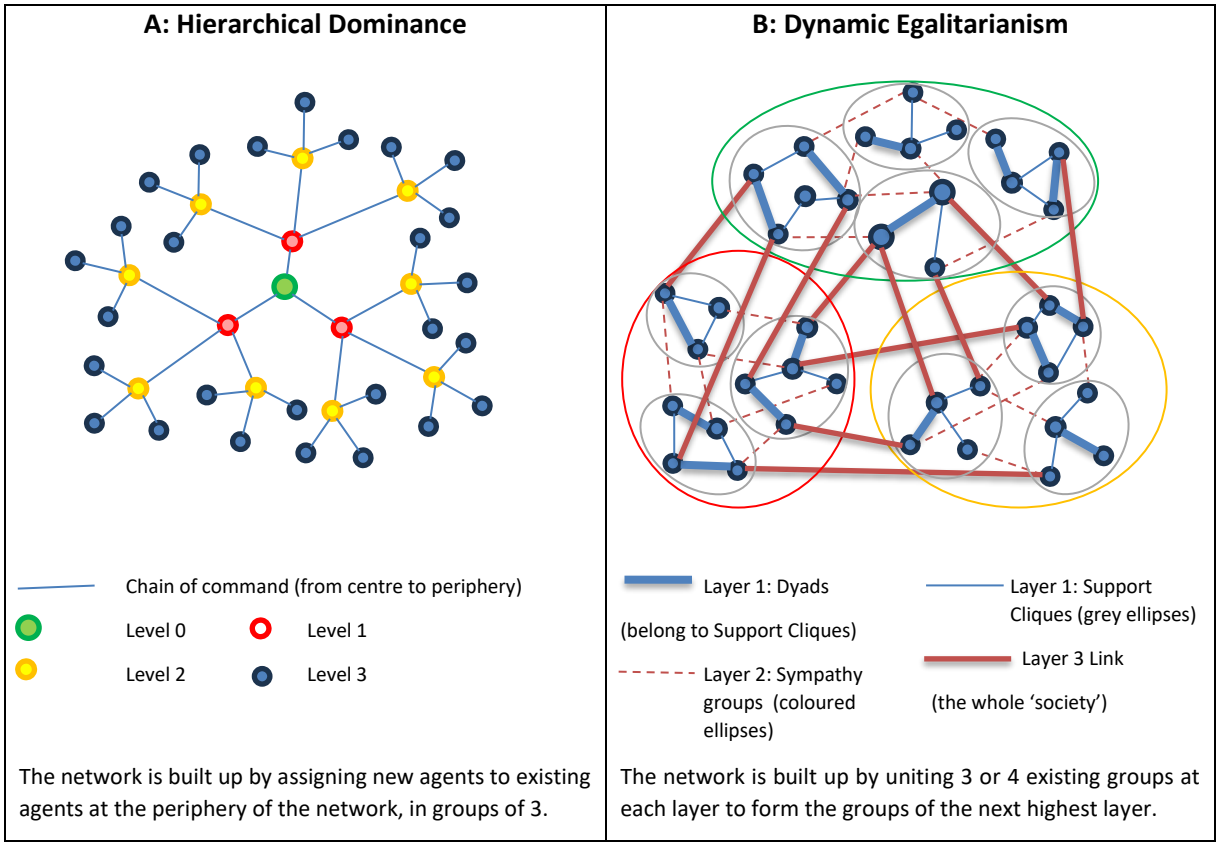
In their study of small-scale human societies, M. S. Harré and Prokopenko (2016) identify two distinct forms of scale-free networks which they call 'Hierarchical Dominance' and 'Dynamic Egalitarianism', as illustrated in Figure 2-6. Hierarchical Dominance is most like Davis and Sumara's (2006) 'Scale-Free' network, Figure 2-5 C. Dynamic Egalitarianism looks a little like Figure 2-5 D, the 'Scale-free with a Few Weak Links' network but is in fact a different form of a scale-free network. 'Hierarchical Dominance' and 'Dynamic Egalitarianism' networks are scale-free In ways that are numerically equivalent but structurally distinct.

Figure 2-6 A and Figure 2-6 B both comprise 40 agents (nodes). Both are growing at a constant scale factor of 3 and are geometrically related to the Sierpinski fractal of Figure 2-3. The Hierarchical Dominance network grows from the top (or centre) outwards whereas the Dynamic Egalitarianism network grows from the bottom up. At each new level, the Hierarchical Dominance network assigns three times the number of agents in the previous level to each of the agents in the prior level as shown in Figure 2-6 A. In the Dynamic Egalitarianism network, contrastingly, growth occurs when existing groups come together in groups of three or four, on average, to form a new group at the next highest layer of relationship (Figure 2-6 B).

According to Harré and Prokopenko (2016 Abstract), "the 'social brain hypothesis' argues that the size of social groups is determined by human beings' neurologically constrained capacity for maintaining long-term stable relationships". The number of links that must be sustained by any agent within the Hierarchical network is never more than four and there are only two forms of relationship, superior and subordinate. The network can therefore, in principle, grow indefinitely providing the social licence of the authority structure holds. The number of relationship links that must be sustained by agents in the Dynamic network, however, increases on average by 1 per layer so there is an upper limit to how large it can grow. The dynamic relationships form spontaneously but to sustain social cohesion more than half of the agents in each layer must be linked with the relationship(s) characteristic of the layer. Harré and Prokopenko conclude that:

Humans were probably egalitarian in hunter–gatherer-like societies, maintaining an average maximum of four or five social links connecting all members in a largest social network of around 132 people.

*Figure 2-6 Two contrasting forms of scale-free social network (figure adapted from M. S. Harré and Prokopenko (2016))*




Why this constraint on maximum group size should be related to only cognitive relationship limitations and not also to our affective and physical relationship limitations is not explained by Harré and Prokopenko (2016) in this article. Their Dynamic Egalitarianism network explanation does however fit convincingly with previous ethnographic studies of actual small hunter-gatherer bands and societies that the authors cite. Dynamic Egalitarian groups interestingly also possess the features of dense neighbour interactions and shared, decentralised authority suggested by Davis and Sumara (2006) as the precondition for trans-level learning, noted above in Section 2.3.4.3.

The Hierarchical and Egalitarian networks have different strengths and weaknesses in terms of social wellbeing. The former makes it possible to effectively coordinate the activities of large diverse groups that can consequently undertake much larger coordinated projects. At the same time, if the hierarchy becomes entrenched the higher-ranked individuals can end up commandeering resources and cultural narratives to the overall detriment of the society. The latter fosters the agency and creativity of individuals. Small groups have richly pluripresent relationships that illuminate their diversity and uniqueness, whereas large-scale societies are dispersed, very unlikely to ever encounter every other member and only belong to the group on the strength of some shared abstract reality like nationality (Widlok & Cruz, 2022). Small groups however also have disadvantages such as a limited range of survival skills, points of view, and ultimately genetic material for out-breeding. As Widlok and Cruz

(2022) point out, it would be wrong to assume that human beings who lived in hunter-gatherer societies for hundreds of thousands of years before the agrarian revolution, lived only in small-scale Egalitarian bands. There is a wealth of evidence that hunter-gatherers alternated between small Egalitarian bands and large hierarchical political organisations, according to their social purposes and in response to environmental circumstances such as seasonal rhythms. Widlok and Cruz (2022) also note how the globalisation of human societies and economic entities in the modern era has generated further levels of complexity and different patterns of activity in human social networks such as corporate entities relocating their manufacturing to nations with low labour costs while scaling up their research, development and management in another where taxation is low. Here we come full circle to recognising the essential inseparability of complex structures and complex behaviours.

Social network theory shows how the structuring of teachers' professional relationships could be improved to facilitate education for Sustainable Wellbeing. Dynamic Egalitarian networks may have a role in developing a scale-free structured approach to Cross-Curricular Holistic (CCH) teaching teams complementary to the existing role of Hierarchical Dominance networks in coordinating Subject-Based Specialist (SBS) departments and school administration. Schools with high school-aged students in New Zealand vary widely in size. In 2022, four schools had over 2,500 students but 265 (half) had 421 or fewer. As I report in Section 6.2.3, these disparities of scale are correlated with how likely schools are to support education for Sustainable Wellbeing. Social network theory might have a role also in resolving the difficulties associated with this lack of engagement with education for Sustainable Wellbeing in larger schools.

### 2.3.6 Section Summary

Seeing secondary schools as complex adaptive systems within the complex systems of their communities, nations and ultimately the planet has profound implications for the way we manage education and organise the curriculum at this moment of human evolution. Real systems exhibit general complexity, that is they are theoretically irreducible, rule-conditioned and yet ultimately mysterious. The effectively unpredictable but essentially deterministic behaviour of complexity generated by computer-based algorithms and their mathematical visualisations are examples of restricted complexity which although ontologically distinct from generally complex phenomena are through their simulations providing us with deep insights into how we may more sustainably participate in our social networks as transformative agents within our generally complex, natural environment, social, planetary and educational systems.

Recalling the Lorenz attractor image of Figure 2-1, I am reminded of the animated versions of this graphic and the rhythmic way in which any trajectory of the system evolves in time moving periodically but unpredictably like a heartbeat through the bifurcation transitions between the two basins of attraction. This is a perfect metaphor for how complementary alternative states such as the Egalitarian and Hierarchical networks or CCH and SBS modes of teaching could coexist to support a resilient, coherent, and environmentally responsive social system.

The potential for a vision like 'Sustainable Wellbeing' to act as an effective attractor phase shifter for our education system depends on the meanings and values people associate with this phrase and the way the vision is articulated. In the following section, I explore the ideas of some leading writers in the fields of Sustainability, Wellbeing, and Education for Sustainability, in search of insights into what associations might most effectively invoke an SWM attractor phase shift for the Anthropocene.

## 2.4 Sustainability, Wellbeing, and Education

### 2.4.1 Section overview

In this section, I review the mainstream interpretations of the meaning of sustainability and its dimensions along with some alternative views from Western academic literature and how they have influenced the school subject of Education for Sustainability, particularly in Aotearoa New Zealand. I review also the various interpretations of the term 'Wellbeing' in the literature, how societal wellbeing may be measured, the distinction between affective and psychological wellbeing, and the literature on Education for Wellbeing, including the Te Ao Māori conception of Hauora—Te Whare Tapa Wha model (Durie, 2009)— which is embedded in the New Zealand Curriculum (NZ Ministry of Education, 2007).

In this section, I also introduce the primary elements of the SWM framework and its theoretical basis. The development of the SWM framework—through co-construction with my research participants—was the essential first goal of this study. The Human-Societal level of the framework is introduced under the heading of Sustainability, and the Individual-Interpersonal level under the heading of Wellbeing.

The section ends by considering the significance of combining Sustainability and Wellbeing in the phrase 'Sustainable Wellbeing' and the implications of that synthesis for measures of social progress, our conception of the Self, the meaning of being human, and addressing students' diverse attitudes towards Climate Change and the sustainability crisis through educational paths that have heart.

### 2.4.2 Sustainability

*Definitions for Sustainability*

The original meaning of 'sustainability' from the field of ecology meant simply "the potential of an ecosystem to exist over time" (Scott, 2012, p. 42). Huckle (2014) observes that "In the 1980s the term became appropriated as a mediating term to bridge the ideological and political differences between the environment and development lobbies" (p. 33) and 'sustainability' became increasingly conflated with the term 'sustainable development'. Perhaps the most often cited definition of sustainable development is that of the Brundtland report, *Our Common Future*, of the World Commission on Environment and Development (WCED), chaired by Gro Harlem Brundtland. The first paragraph of the second chapter 'Towards Sustainable Development' states:

> 1. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:
>
> - the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
> - the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.
>
> (WCED, 1987, p. 37)

The authors' concern for global social justice is clear and there is an apparent recognition that the needs of the world's industrialized developed nations need to decrease. In her foreword, the chairman states:

> Many of the development paths of the industrialized nations are clearly unsustainable. And the development decisions of these countries, because of their great economic and political power, will have a profound effect upon the ability of all peoples to sustain human progress for generations to come
>
> (1987, p. 7)

And yet the concepts of 'sustainable' and 'development' as they have been applied in the decades following the publication of *Our Common Future* have appeared politically irreconcilable. Sustainable Development was the underlying assumption of the United Nations's eight Millennium Development Goals (MDG) set in 2000 and of the seventeen Sustainable Development Goals (SDG) which replaced the MDG in 2015 (See Appendix 8C-4.2 for a full list of the SDGs). SDGs 6, 12, 13, 14, and 15 relate to humanity achieving 'harmony with nature' and protecting the planet from degradation. Goal 8, however, is concerned with achieving human development objectives. Target 8.1 acknowledges the greater need of Least Developed Countries (LDC) and sets a minimum GDP growth rate target of 7% for them (United Nations, 2015), but target 8.2 effectively supports a continued annual GDP growth rate of 3% in developed nations. Hickel (2019) argues that this is incompatible with achieving (a) any reductions in aggregate global resource use and (b) reductions in CO2 emissions rapid enough to stay within the carbon budget for 2°C. In other words, Goal 8 violates the sustainability objectives of the SDGs.

*The United Nations' Sustainable Development components*

This incompatibility among the SDGs may be traced back to the Brundtland report itself which, along with its intergenerational definition, also included a triangular model of sustainable development which connected three variables: People, Planet, and Profit. Critics of this model maintain that it presumes an unavoidable inherent conflict between human needs and environmental limits which can only be reconciled through the economy (Valera & Salazar, 2020). This '3Ps' model of sustainability is affirmed in the United Nations' 2005 definition of the three aspects of sustainable development as being economic development, social development, and environmental protection, describing them also as being "interdependent and mutually reinforcing pillars" (United Nations General Assembly, 2005, para. 48). However, no one has specified exactly how they interdepend and mutually reinforce (Nilsson, 2018).

The SDGs have also been critiqued for not explicitly recognising the essential role of cultural perspectives and values in interpreting and constructing the meaning of 'sustainable development'. Education is fundamental to cultural transmission and evolution. SDG 4 specifically addresses Business as Unsustainable (BaU) education in terms of its potential economic and social benefits rather than its potential to raise awareness of the environmental consequences of those 'benefits'. As Sterling (2016) remarks "This goal would benefit greatly from extended wording to reflect the fact that most educational programmes do not yet reflect the purposes and goals of sustainable development, and some may even exacerbate sustainability issues" (p. 211). Education also raises the issue of the fitness for (sustainability) purpose of the wide range of world views represented by indigenous cultures compared to the hegemonic Western culture which dominates the United Nations' implicit meaning of education. As Komatsu and Rappleye (2018) wryly observe, "the world is the most educated it has ever been and yet the nearest to environmental breakdown" (p. 6).

*Dimensions of Sustainability and Wellbeing*

To address the what, how and when questions of sustainability, various dimensional schemes beyond the Brundtland report's 'People, Planet, and Profit' have been devised. In 2018, publications from the United Nations described the dimensions of Sustainable Development as being economic, social and environmental (Leicht et al., 2018). New Zealand's Education for Sustainability (EfS) curriculum (NZ Ministry of Education, 2015a) and literature (Birdsall & Glasgow, 2014; Eames & Birdsall, 2019) list environmental, social, cultural, and economic as the four aspects of sustainability. By 2022 the United Nations had redefined its dimensions of Sustainable Development as the five pillars of its Sustainable Development Goals (SDG)—People, Planet, Prosperity, Peace and Partnership (United Nations Sustainable Development Group, 2022) demonstrating the extent to which the concept of 'Sustainability' is still very much a moving semantic target. However the domains, dimensions, spheres, or pillars of sustainability are defined, all writers seem to agree that they are complexly interrelated.

In a bid to replace the weak, trade-off, interpretation of Sustainability with a strong, critical-realist version, I adopt, in this study, a framework of three primary domains for the Sustainable Wellbeing Metacurriculum (SWM) based on the principle of humanity's relationships with, and responsibility for, our natural environment, our social world, and for ourselves as an evolving species (Michelsen et al., 2016). The domains of this SWM framework are Ecosphere, Social Justice, and Cultural Vision. The naming and characterisation of the three domains have been determined by many influences, particularly by the works of Lucie Sauvé and Rudolf Steiner. The concepts corresponding to the SWM framework domains in Sauvé's (2009) conception of Sustainability are concentric spheres, the Ecosphere, Sociosphere, and Psychosphere. The corresponding elements in Steiner's three-fold commonwealth are the 'Economic Life', the 'Rights Life', and the 'Spirit-cultural Life' (Steiner, 1922).

*Sauve's Spheres*

In her essay on environment-related education *Being Here Together,* Sauvé (2009) describes three interrelated spheres of personal and social activity: the Ecosphere, the Sociosphere, and, the Psychosphere. The Ecosphere is the domain of humanity's relationship with the *Oïkos*, this house of life which we share with one another and with other living beings. The Ecosphere itself is comprised of three components: *Eco-logical*, *Eco-nomic* and *Eco-sophic* which bear a self-similar fractal-like relationship to the three spheres, i.e. Sauvé's primary domains. Sauvé does not elaborate on her other two spheres in this same fractal detail, presumably because her focus in this book is environmental education. The Sociosphere is the domain of interaction with other humans, both individuals and social groups. In this sphere, we experience the benefits and challenges of living with others. That part of identity which derives from our reference culture and our sense of belonging develops here. To this sphere belongs education regarding human rights, politics, and citizenship. In the Sociosphere the other person is understood "as on the same level as oneself, as an end in him or herself and not as an instrument" (Miguelez 1997, cited in Sauvé, 2009, p. 332). The Psychosphere for Sauvé is the locus of identity construction, where the self is forged through confronting its own characteristics, abilities, and limitations. Through entering into relationships within the Ecosphere and Sociosphere, the self enters a process of continual individuation and integration of the elements of the self into a whole. In the Psychosphere, self-esteem, autonomy, reflexivity, and the capacity for critical distancing are developed. While Sauvé's Ecosphere references humanity as a whole, her Sociosphere addresses the interpersonal and her Psychosphere the intrapersonal Self, rather than the worldviews and evolution

of human cultures. In this cultural sense, the SWM framework's domain of Cultural Vision aligns more closely with Rudolf Steiner's (1922) concept of the Spiritual-Cultural life.

*Steiner's 3-Fold Commonwealth*

For Rudolf Steiner a healthy human society, the 'body social', had to be aware of and uphold three interrelated but independent 'lives': The Economic Life, the Rights Life, and the Spiritual-Cultural Life. The economic life is concerned with everything in the way of commodities that humanity needs and produces from nature including their circulation and consumption. The life of public rights Steiner also described as whatever must exist in the body social because of men's (sic) personal relations to one another which includes the life of the State where "State" means a community possessing common rights. Steiner (1922) regarded the term 'Spiritual-Cultural' to be more accurately expressed as "Everything that rests on the natural endowments of each single human being—everything that plays a part in the body social on the ground of the natural endowments, both spiritual and physical, of the individual" (p. 56). Steiner saw Fraternity, Equality, and Liberty, the social ideals that inspired the French Revolution, as being the proper guiding principles for the economic, rights, and spirit-cultural lives, respectively. He sympathised with those critics who pointed out the, apparently, irreconcilable tensions between these ideals, yet emphasised their aspirational power for the collective imagination of humankind. He specifically rejected the idea that these tensions could be resolved by centralising control of the three independent lives in an all-powerful state. Steiner, like Marx and many other influential thinkers of his time—who were also inspired by the ideals of Fraternity, Equality, and Liberty and also recognised environmental concerns such as the soil destruction being wrought by capitalist agriculture (Rappleye & Komatsu, 2020)—does not appear to have anticipated the pending impact of anthropogenic Climate Change and finite global environmental limits on humanity worldwide.

*Steiner's interpretation of Self-similarity*

Steiner draws a connection between his concept of a healthy human society, the 'body social' and the individual human organism which is, in essence, a self-similar fractal-like analogy, although, of course, writing in the early part of the last century, he never applied that term to his own thinking. The three lives of the body social are for Steiner an expression of the three-fold nature of *homo sapiens* as willing, feeling and thinking beings, with these subjective faculties being physiologically associated with the limb-digestive, chest rhythmic, and head nerve-sense systems of the body respectively (Steiner, 1919, 1922). In more recent literature willing, feeling and thinking are also referred to widely as the action, affective, and cognitive domains of learning (Eames & Birdsall, 2019); or hands, heart, and head (Birdsall & Glasgow, 2014; Giangrande et al., 2019; Napal et al., 2020; Trott, 2020).

Steiner describes how each of the three anatomical structures, the digestive system with the limbs, the chest system, and the head system, contains within it, components related to the other two. The head, for instance, has the head-proper component of the brain but also the chest breathing-related system component of the nose, ear, and their connecting sinuses; and the digestive-limb-related system of the jaws and teeth, particularly the limb-like lower jaw (1919, pp. 182–183). Steiner stressed that he did not wish to take physiological scientific truth and transplant it literally onto the social system. Rather he wished "to use the human body as an object lesson for training human thought and feeling to a sense of what organic life requires, and then to apply this perceptive sense to the body social" (1922, p. 52).

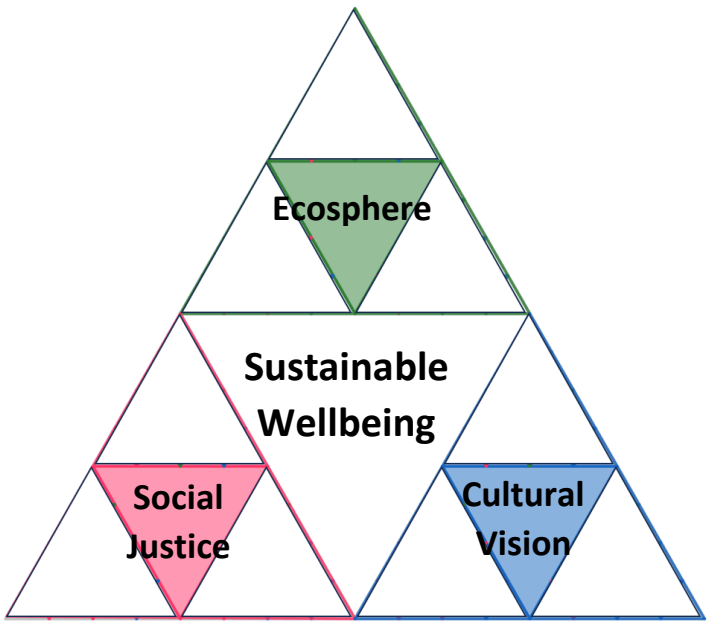
### 2.4.3 The Sustainable Wellbeing Metacurriculum Framework, Human-Societal Level

I use three domains as the starting point for the co-construction of a metacurriculum framework linking sustainable wellbeing to the traditional disciplinary learning areas of the secondary school curriculum. These three domains; Ecosphere, Global Justice, and Cultural Vision—representing humanity's relationships with its natural environment, its social world, and itself respectively—are shown diagrammatically in Figure 2-7.

The diagram shows the top two layers of the Human-Societal level of the multi-levelled, multi-layered, form of the Sustainable Wellbeing Metacurriculum (SWM) framework. The full framework is structurally a tri-polar version of the Sierpinski Fractal described in Section 2.3.5, and Figure 2-3 which I call a Triadic Sierpinski Fractal (TSF). The self-similar fractal structure of the TSF represents the intimately entwined yet always distinguishable relationship of the three domains to one another. In this section, and Section 2.4.6, I present the theoretical basis for the initial SWM framework's Human-Societal level domains and Individual-Interpersonal level domains. In Section 2.6.2, I use multi-layered TSF diagrams to illustrate the full fractal self-similar representation of the SWM framework.

'Sustainable Wellbeing' at the centre of Figure 2-7, functions as the visionary attractor for the Human-Societal level of the framework, inspiring and coordinating the system's self-organisation. The first objective of this study was the elaboration of the SWM framework—through a co-construction process with my research participants—to a stage where it could be of practical curriculum planning value for teachers developing a schoolwide SWM for years 11 to 13 students.

*Figure 2-7 The three domains of the Sustainable Wellbeing Metacurriculum (SWM) on the Human-Societal level centred on the Sustainable Wellbeing of Humankind.*



A fundamental strength of this three-fold structure for sustainability is that the domains are expressions at the human-societal level of the three primary embodied domains of individual wellbeing at the individual-interpersonal level; Action, Feeling, and Thinking, i.e the kinesthetic (behavioural), affective (socio-emotional), and cognitive (mental) domains of learning, (Leicht et al., 2018; Räthzel & Uzzell, 2009; Tilbury, 1995). Central to the three-fold domains are 'Sustainable Wellbeing' at the human-societal level, and the 'Integrating Self'—the locus of spiritual wellbeing—at the individual-interpersonal level. From a complexity point of view—'Sustainable Wellbeing' and the 'Integrating Self'—serve as labels for system attractors at each of these fractally related levels, albeit attractors of very different duration, character and stages of emergence or 'incarnation', as Steiner (1907) described what might also be described as the 'emergence' of the Self at birth (Dahlin, 2017). The complex interrelationship of sustainability domains is modelled in the SWM framework using the Sierpinski triangle and scale-free social networks introduced in Section 2.3 and as further elaborated in Section 2.6.2.

The exclusion of Economic development as a primary domain from the SWM framework requires explanation. The natural environment, society, and humanity itself are realities with which humanity has relationships. 'The economy' by contrast is an abstraction, a cultural construct which has become steeped in unexamined assumptions of what 'the economy' must be, while its superficially varied ideological expressions are fiercely politically contested. SDG target 9.2, for instance, maintains that economic development needs to be industrial with no explanation of whether this is a means to an end or an end in itself (Hickel, 2019). Citing the writings of Bruno Latour, Choat (2018) makes a similar argument for the deployment of the term 'Capitalism' as a catch-all explanation:

> Capitalism—like the State, Empires and Classes—is at most a result or effect of myriad interactions, mediations and networks (Latour, 1993: 120). In this sense, 'capitalism does not exist' (Latour, 1988: 173): to talk of capitalism is to obscure the relations that we should be examining and to substantialise what are in reality supple and contingent attachments and interactions that can be easily made and unmade.
>
> (Latour, 2013, as cited in, Choat, 2018)

'The Economy' as a concept is related to the three primary domains of the SWM framework in a manner analogous to how the term 'physiology' is related to the nerve-sense, rhythmic-circulatory, and limb-metabolic systems of the physical body. It is an aspect of them all and its expression in each is dependent upon the character and direction of the relationships these organic systems are maintaining with one another and their environment. Ecosphere, Global Justice, and Cultural Vision are also abstractions but they are clearly defined in terms of fluidly evolving relationships with definite realities, the natural environment, the global human population, and the evolving trajectory of our species. The SWM framework adopts the strong sustainability principle that 'the Economy' cannot meaningfully be separated from the environment and the wellbeing of ecosystems upon which all its aspects ultimately depend rather than 'Weak sustainability' involves existing economic and social issues being refocused to include environmental goals. While many initiatives under weak sustainability do indeed improve the environment and reduce poverty, at best their efforts achieve no more than making the world less unsustainable (Cartwright et al., 2009; Scott, 2012).

## 2.4.4 Education for Sustainability (EfS)

### *2.4.4.1 What is EfS? Definitions and Key Objectives*

#### *2.4.4.1.1 History of EfS, the United Nations' SDGs and EE*

Almost a decade ago, Lotz-Sisitka and Price (2016) observed that "engagement with the processes of integrating environment and sustainability concepts, knowledge, pedagogical practices and values into national curricula is worldwide" (p. 3). The word 'sustainability' appears ten times in the New Zealand Curriculum (NZC) (NZ Ministry of Education, 2007) including under the principle of 'Future Focus' and the key competency of 'Participating and contributing' in the phrase "sustainability of social, cultural, physical, and economic environments" (p. 13). Education for Sustainability (EfS) has long been recognised within the curriculum (NZ Ministry of Education, 2015a) but in 2024 it continues to languish as a marginal subject within the Social Sciences learning area. In 2022 less than 1% of senior students nationwide were participating in even the most popular of the NCEA Environmental Sustainability standards (New Zealand Qualification Authority, 2023b).

The Journal of Environmental Education's inaugural issue in 1969, contained the following definition: "*Environmental Education* is aimed at producing a citizenry that is *knowledgeable* concerning the biophysical environment and its associated problems, aware of *how* to help solve these problems, and *motivated* to work toward their solution" (Stapp, 1969, p. 30, emphases in the original). Six years later a United Nations-ratified agreement, which became known as the *Belgrade Charter* described the goal of Environmental Education (EE) as being "to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions to current problems, and the prevention of new ones" (UNESCO-UNEP, 1975, p. 3). The United Nations' conception of EE was given a yet more action-oriented framing in the *Tbilisi Declaration* which came out of the first Intergovernmental Conference on Environmental Education, in Tbilisi, Georgia, USSR in 1977. The focus of EE according to the *Tbilisi Declaration* is: to successfully "acquire the knowledge, values, attitudes, and practical skills to participate responsibly and effectively in anticipating and solving environmental problems, and in the management of the quality of the environment" (UNESCO 1978, 2).

During the 1980s the concept of EE became overtaken by the idea of Sustainable Development (SD) which expanded environmental protection to include the economic and social aspects of sustainability that underpinned the Brundtland report of 1987. The Brundtland report suggested that the world's teachers have a crucial role to play in helping to bring about the extensive social changes needed for sustainable development (Shephard, 2020). The Earth Summit of 1992 in Rio de Janeiro reaffirmed the significance of education for SD in its conference document titled *Agenda 21* (Eames & Mardon, 2020; Shephard, 2020). The first use of the acronym EEFS (Environmental Education for Sustainability) arose also at this time—perhaps as a sceptical reaction to the implausibility of 'sustainable' in the same sentence as 'development'—and with it a degree of confusion about how, or if, EEFS differed from the notion of education for SD (Tilbury, 1995). While the rest of the world has spoken about Education for Sustainable Development (ESD), EEFS or EfS have been the preferred terms in New Zealand government publications since the 1990s (Shephard, 2020).

It was the 1992 Rio de Janeiro Earth Summit that provided the original inspiration for the now hugely popular New Zealand Enviroschools movement founded with the help of the University of Waikato in Hamilton by a group of City Councillors who attended the summit (Eames & Mardon, 2020). The orientation of these first NZ eco-schools was simply EE rather than either education for SD or EEFS. Eames and Mardon (2020) reported that "The Enviroschools Programme has grown from the original

three pilot schools in 1993 to now include nearly 1200 schools and kindergartens, supported by 120 facilitators, 16 regional coordinators, and over 100 partner organisations" (p. 56). Despite the success of the Enviroschools movement and various efforts to establish and sustain Environmental Education and EfS practice in New Zealand schools and early childhood education over recent decades, research commissioned by the Ministry of Education and conducted by the New Zealand Council for Educational Research (NZCER) found "that while there have been many pockets of progress and development across all of these areas over the past 11 years, this progress is unevenly spread and has lacked high-level coordination" (Bolstad et al., 2015, p. 14). Eames et al. (2010) note that "ongoing challenges remain for fostering EfS in large primary and secondary schools: building a strong local knowledge base in EfS, and developing a coherent education strategy for Aotearoa New Zealand EfS" (p. 2). A more recent report for the Enviroschools organisation found that while the movement had many positive impacts on schools and student learning, "Most respondents did not think that Enviroschools supported transitions between [Early Childhood Education] ECE centres, primary and secondary schools" (Wypych & Field, 2021, p. 5). The practicalities of working inter-departmentally in secondary schools may moderate the uptake of cross-curricular EfS courses, combined for instance with outdoor education, in some schools (Cosgriff & Gillespie, 2011). There are also issues related to the regulations around how credits are to be accumulated to achieve university entrance that can discourage teachers wanting to devise courses that reflect 21st-century [realities] (Hipkins & Spiller, 2012).

#### *2.4.4.1.2 sustainable global citizenship*

While the manifestation of EfS in schools has prioritised the Environmental domain of sustainability, the role of education in fostering systemic societal change for sustainability through individual and collective agency continues to be stressed in the EfS literature. With the caveat that a universal, all-encompassing definition of sustainability education is unfeasible, Koskela and Paloniemi offer the following definition:

> Sustainability education refers to education that encourages action towards sustainability transformations, i.e. the societal changes that aim to secure the well-being of humans and the other natural world as well as just and peaceful societies within the planetary boundaries.
>
> (Koskela & Paloniemi, 2022, p. 2)

These authors further emphasise that behaviour change as a goal of sustainability education is not the same thing as agency. Behaviour change implies that particular behaviour patterns are being altered in predetermined ways, while sustainability agency "refers to the capacity to be attentive and proactive in finding possibilities to either act in a more sustainable manner or to advance changes towards sustainability individually, through others, or with others" (p. 7). Granados-Sánchez (2023) uses the phrase 'sustainable global citizenship' in preference to 'Ecological citizenship', 'Environmental citizenship', or 'global citizenship' as defined by the United Nations;

> because the concepts of sustainability and sustainable development are more holistic and intentional than that of the environment and, moreover, direct us towards a horizon. ...
>
> In addition, using sustainable global citizenship makes it easier to link the field of citizenship with that of education for sustainability, two fields that until now have evolved in parallel and without a clear and determined connection that must be solved.

(p. 5)

The United Nations' concept of 'global citizenship' has also been criticised as being dominated by elitist Western visions of a Utopian global citizenship. An alternative 'Pluralist' interpretation of 'global citizenship' effectively requires it to be locally defined (Abdi, 2015 cited in Granados-Sánchez, 2023)

### *2.4.4.2 The role of teachers and schools*

The extent to which school teachers and schools can or should be expected to address the sustainability crisis is debated by teachers around the world (Shephard, 2020). The mounting evidence of environmental degradation and its impacts on human wellbeing, I argue, as described in my opening section, make them impossible to ignore for teachers genuinely and professionally committed to the wellbeing of their students. As Sauvé (2009) argues, "Through [environmental] education, we contribute to major cultural change and toward a culture of belonging and commitment. Here, environmental education is ontogenetic: learning to be here together, fully, and ethically" (p. 328). Yet, for teachers to take a principled stand despite or without an appreciation of their communities' values can be a serious strategic error, if the possible consequences, timing and context are not thought through. On 16 October 2020, outside his school in a Paris suburb, a history teacher, Samuel Paty, was beheaded by an 18-year-old attacker and suspected Islamist. Earlier that month, the teacher had used cartoons of the Prophet Mohammad in a class on freedom of expression, angering some Muslim parents (Reuters Staff, 2020). While Aotearoa New Zealand teachers have to date been less likely to face such violent values-based extremism, our nation no longer feels as immune as it once seemed since the 2019 anti-Islamist terrorist attack on mosques in Christchurch (Royal Commission of Inquiry, 2020). Nevertheless, very real political, racial, and religious tensions are as present in New Zealand classrooms as they are in classrooms anywhere on the planet. Discussing ecological sustainability, for instance, with students in rural areas whose parents' livelihoods are tied to unsustainable farming practices can elicit emotionally charged pushback, an experience I can personally attest to.

To be effective, in light of the very real dangers, education that puts Sustainability and Wellbeing at its heart must give teachers the social license, encouragement, protection and means to put the contentious issues in front of students for their critical examination. The most effective contribution that educational research can make to society at this time, in my view, is to facilitate the co-construction of a theoretically coherent metacurriculum framework that empowers teachers, and senior secondary and tertiary level students to address the sustainability crisis head-on.

There are signs that societal trends toward increasing the priority of such education are already underway. Environmental Sustainability standards were first intended to be made available by 2009 at levels 2 and 3 of New Zealand's NCEA school-leaving qualification (Morey, 2008). Education for sustainability is being used to design cross-curricular courses to study real-world issues of relevance to students and create alternatives to more traditionally designed science courses that encourage students' engagement with science for citizenship (Birdsall & Glasgow, 2014; Hipkins & Spiller, 2012). Bolstad et al. (2015) describe a pilot project designed to explore how the 'future focus' theme of sustainability, in the *New Zealand Curriculum* (NZC) (NZ Ministry of Education, 2007) can be integrated into the secondary school curriculum by drawing on distinctive ecological knowledge and practices that can be accessed within English and social sciences courses. How Aotearoa New Zealand secondary schools might be enabled and encouraged to undertake the radical but critically significant challenge

of transforming education for sustainability from being a marginal learning area to being the central focus of their years 9 through 13 curriculum, is the focus of this research project.

## 2.4.5 Wellbeing

### *2.4.5.1 Wellbeing Overview*

The Western concept of human wellbeing has followed more or less the same path under the influence of the same cultural assumptions as our concept of sustainability and economic development. The difficulty of defining exactly what we mean by wellbeing is reflected in the variety of terms used interchangeably for it including quality of life, life satisfaction, welfare, utility, preference, happiness, prosperity, human flourishing, and human development (Scott, 2012). The United Nations' Brundtland definition of Sustainable Development uses the no less vague and problematic term 'needs' to encompass the great variety of factors that sustain the wellbeing of people and living systems in general.

Through the twentieth and into the twenty-first century the idea of quality of life being equivalent to material wellbeing became expressed in terms of economic growth, initially as measured by gross national product (GNP) and then later by gross domestic product (GDP) (Offer, 2006; Veenhoven, 1996). Wellbeing and social welfare have been increasingly acknowledged as complex realities that are not equivalent and cannot be adequately measured by aggregate economic growth, yet unsustainable consumption of goods and services still dominates public policy assumptions about wellbeing (Marks et al., 2006; cited in Scott, 2012).

A second theme of mainstream wellbeing debates has been the reduction of wellbeing to individual preferences and self-actualisation, which overlooks the role of socio-political structures in determining the limits of wellbeing especially for minority groups such as the disabled (Edwards & Imrie, 2008), but also for all of us in respect of environmental degradation. As such, "Sustainability requires us to think as a collective, rather than what we as individuals can get from or give to a community; it asks us to think about human wellbeing as a common project and to make sacrifices for people with whom we will never have a relationship" (Scott, 2012, p. 50). Encouraging people to think of themselves as autonomous, enterprising individuals responsible only for their own welfare is an integral part of the one-sided neoliberal economic project but it is also a conception of the self, which is long embedded in Western culture (Rose, 1990). This tension is also implicit in the three-domain SWM model I have proposed and it can only be resolved I will argue, through a complexivist understanding of the emergence of a self-organised global 'self' of humankind arising from the free collaboration of aware, autonomous individuals, something which can still only be expressed as an aspiration in our time.

A third tension, also symptomatic of the Western culture's logical positivist history, is between attempts to articulate a realistic ontology of wellbeing and the empirical need to define wellbeing with sufficient clarity and consensus to make it measurable for public policy purposes. Nevertheless, the term is useful in that it evokes associations with values including but transcending the purely material needs of life. In essence, "[Wellbeing] is conceptually useful in drawing into direct relationship the social, psychological, 'spiritual' and physical dimensions to which many discussions refer" (Dinham, 2007, p. 183).

### *2.4.5.2 Measuring Wellbeing*

*GDP Alternatives*

Gross Domestic Product (GDP), invented after the Great Depression in the 1930–1940s, is probably the most widely used measure of nations' economic well-being and social progress but has also been criticised as ignoring other indicators of social progress "such as subjective well-being, equity, and environmental sustainability" (Wang & Chen, 2022, p. 1). GDP takes no account of the distribution of economic growth across society which then allows glaring inequalities to be ignored and the interests of minorities to be consistently overlooked (Dasgupta, 2001; Nussbaum, 2000). Dissatisfaction with GNP gave rise in the 1960s to the concept of Quality of Life (QoL), a more complex and multidimensional goal of societal progress (Noll, 1996). QoL policies aimed at non-monetary welfare distribution used 'objective' social Indicators such as life expectancy, employment and education levels (Erikson, 1993). However, even as recently as 2022, there are still very few measures of wellbeing devised or in use at the national and regional levels that effectively reflect aspects of wellbeing beyond those quantified in GDP (Wang & Chen, 2022).

*Reconceiving Wellbeing*

In the 1990s Amartya Sen introduced the concept of 'capabilities' as the basis of human wellbeing, arguing that measures of equality of resources and welfare are insufficient for achieving social justice (Sen, 1993). Focusing only on individual satisfaction, for instance, overlooks the fact that people adapt their expectations to their circumstances (Scott, 2012) and the circumstances of different groups are already far from equitable. Sen locates the basis of wellbeing in the opportunity to fulfil one's potential rather than in the assumed possession of rights or resources. The capabilities approach does not however solve the problem of defining what QoL opportunities should look like and how to measure it.

The 'needs' approach to wellbeing as popularised by Abraham Maslow in the 1960s is similar in many ways to the capabilities approach. Maslow's hierarchy of human needs originally comprised five levels: Biological and physiological; Safety; Social; Esteem; and Self-actualization (McCleod, 2013). He amended his model, in 1969, adding self-transcendence as a step beyond self-actualization (Koltko-Rivera, 2006).

Maslow suggested that people satisfy needs from the most basic to higher-level needs progressively (McCleod, 2013). In contrast to this sequential hierarchy of needs satisfaction, Nussbaum's (2003) list of ten central human capabilities must be attained holistically:

> in some form, all [ten] are part of a minimum account of social justice: a society that does not guarantee these to all its citizens, at some appropriate threshold level, falls short of being a fully just society, whatever its level of opulence.
>
> (2003, p. 40)

Although Maslow's list is more succinct, Nussbaum's holistic approach, I suggest, is more consistent with a complexivist interpretation of wellbeing.

Complementing the theoretical work on wellbeing over the last 50 years has been the development of subjective wellbeing measurement in psychology. One important outcome of subjective wellbeing research has been the reported negative correlation found between materialism and subjective wellbeing. People who hold more 'intrinsic' values, like building loving relationships and self-development report greater happiness than those focused on 'extrinsic' like status, material

possessions and personal brand. Many studies have found that subjective wellbeing and material wealth are positively correlated up to a certain point. The relationship between income and happiness is more nuanced than the economic theory of individual utility maximisation assumes (Scott, 2012).

`

#### *2.4.5.3 Psychological wellbeing*

A key distinction in the field of subjective wellbeing research exists between hedonic or affective wellbeing and eudaimonic or psychological wellbeing. Hedonic wellbeing research focuses on people's subjective assessments of their life satisfaction in various 'domains' such as work, relationships, leisure and environment. The term eudaimonic wellbeing derives from Aristotle's claim that happiness, feeling good or satisfying appetites is inferior to the highest human value, that is, striving to achieve the best within us. The term eudaimonia thus captures the two great Greek imperatives: first, to know yourself, and second, to become what you are (Ryff, 2014). Affective and psychological wellbeing are distinct but complexly related constructs. Increased eudaimonic wellbeing accompanies increased hedonic wellbeing but can also accompany negative changes in hedonic wellbeing. These results support the 'Affectively Negative Need Fulfilment Model' (Juhl et al., 2017) which maintains that "experiencing psychological stress (not only extreme negative traumatic events) encountered as a consequence of pursuing one's goals … may enhance psychological wellbeing (i.e., purpose in life)" (Cobo-Rendón et al., 2020, p. 519). Resilience—the capacity of some people to sustain or even increase their wellbeing in situations of adversity—gained through improved psychological well-being, is likely to be an increasingly valuable character trait for meeting the challenges of the Anthropocene meta-crisis, so long as people have goals meaningfully related to addressing the crisis.

### 2.4.6 The Sustainable Wellbeing Metacurriculum framework, Individual-Interpersonal level

A key issue for a complexivist view of human wellbeing is whether the wellbeing of society is the sum or more than the sum of the wellbeing of all its members. According to Phillips (2006), "the social quality of a collective is not just the accumulation of the life quality of each of its members: it incorporates collective as well as individual attributes and is holistic in its orientation" (p. 176). In this section, I extend the development of the theoretical SWM framework introduced in Section 2.4.3, which addresses Sustainable Wellbeing at the collective Human-Societal level to integrate wellbeing at the Individual-Interpersonal level.

The top two layers of the Individual-Interpersonal level extend the framework's three Human-Societal level domains—Ecosphere, Global Justice, and Cultural Vision—and its Sustainable Wellbeing attractor, as shown in Figure 2-7, with corresponding domains of individual Wellbeing and a corresponding attractor, as shown in Figure 2-8. The three Individual-Interpersonal level domains are 1. Action/Doing, Physical Wellbeing; 2. Affect/Feeling, Emotional Wellbeing; and 3. Cognition/Thinking, Mental Wellbeing. The attractor for the individual-interpersonal level I call the 'Integrating Self' and its wellbeing is holistic and spiritual.

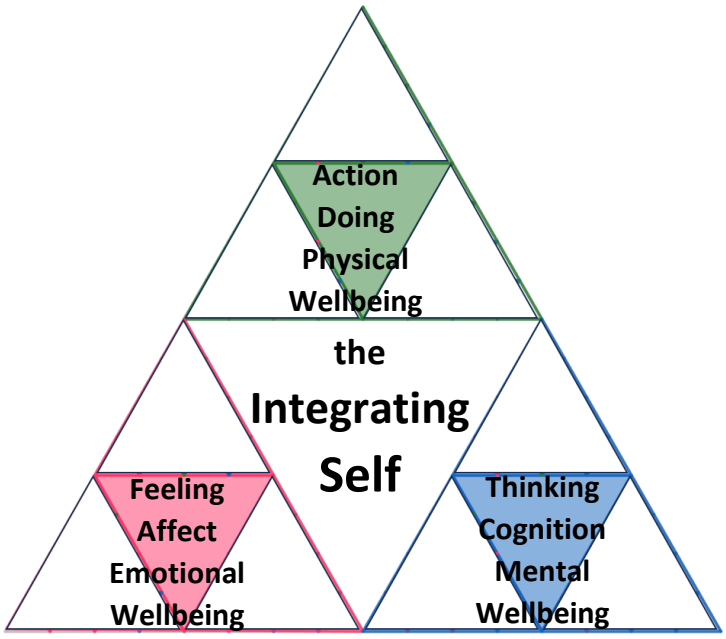
The reasons for the choice of these top-layer elements for the representation of the Individual-Interpersonal Wellbeing level of the SWM framework are:

1. The three domains correspond relationally and naturally with the three domains of the human-societal level, as described in Section 2.4.2. Our relationship with Nature, the

Ecosphere, is mediated through Action. Our relationships with one another, Social Justice, are mediated through Feeling. Our relationship with our own life stories and the evolution of humanity itself is mediated through Thinking. The interpenetration of the domains at all levels is represented by the Triadic Sierpinski Fractal TSF structure of the SWM framework.

2. The Integrating Self is perhaps the most compelling analogy for the concept of a Complex Adaptive System attractor it would be possible to imagine, and suggests how far we may yet need to evolve as a species if 'Sustainable Wellbeing' is to be an effective attractor for the unification of humankind.
3. The domains of Action/Doing; Affect/Feeling, and Cognition/Thinking, are ubiquitous in educational literature as the basic channels of learning. In addition to the authors already cited in Section 2.4.2 who reference these fundamental domains, we could add triads like Hattie and Donoghue's (2016) 'skill, will and thrill', and Drake's (2007) KDB (Know, Do, Be) umbrella model. Bloom's Taxonomy of Educational Objectives (B. Bloom, 1956) is also based on the cognitive, affective and psychomotor domains (Isaacs, 1996).
4. The distinction between elements of Wellbeing at the individual-interpersonal level and Quality of Living elements that are the object of public health policy is clarified with the latter being located in the Social-Justice domain at the Human-Societal level of the framework.
5. As I explore in detail in the following two sections, these four elements of the Individual-Interpersonal level of the framework align closely with two foundational concepts of the New Zealand Curriculum (NZC), (NZ Ministry of Education, 2007), being the five key competencies and the Te Whare Tapa Wha model of Hauora/wellbeing from mātauranga Māori (Durie, 2009).

*Figure 2-8 The three domains of learning/awareness on the Individual-Interpersonal level of the SWM framework, integrated by the Self of the SWM framework.*

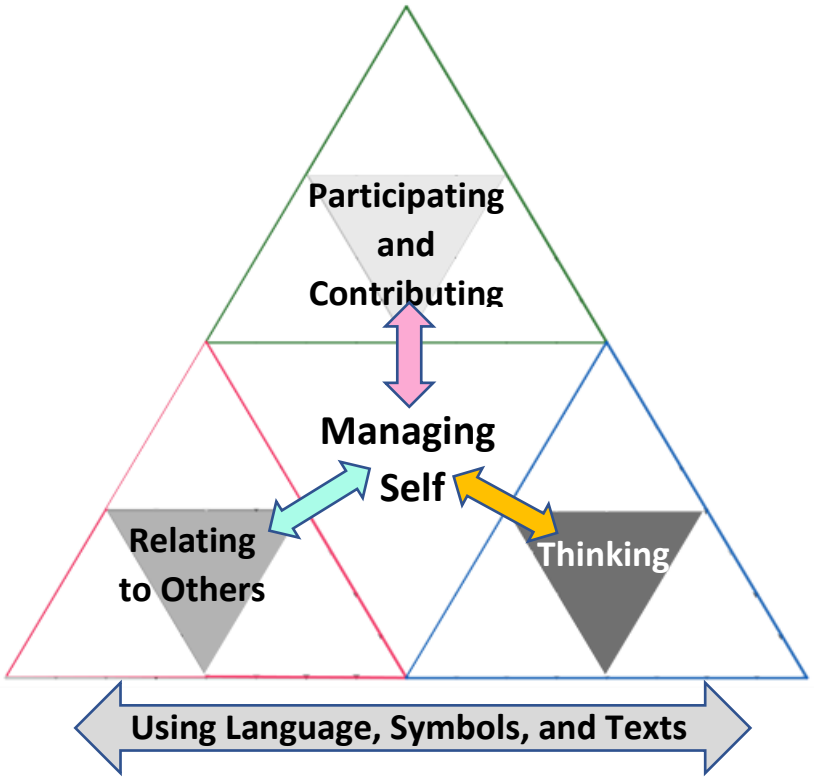


## 2.4.7 Education for Wellbeing In the NZC

### *2.4.7.1 Key Competencies*

The New Zealand Curriculum (NZC) (NZ Ministry of Education, 2007) is a document of two halves. The front half provides what Hipkins et al. (2016) describe as a curriculum-thinking framework. The back half specifies the curriculum content as sets of achievement objectives for each of eight learning areas in eight levels covering all years of schooling from age 5 to around age 17-18. The five key competencies, as named in Figure 2-9, are a component of the front half. Figure 2-9 is a TSF overlay on Figure 2-8 showing how the key competencies; participating and contributing, relating to others, and thinking correspond with the SWM framework domains—action, affect, and cognition respectively—while the key competency 'managing self' corresponds to the SWM framework 'Integrating self', and the key competency 'using language, symbols and texts' can be seen as both an outcome of and an amplifier supporting the emergence of the other four competencies and thus also the SWM framework domains.

*Figure 2-9 A Triadic Sierpinski Fractal (TSF) representation of the NZC Key competencies showing the competencies in relationship to their corresponding SWM framework*



#### *2.4.7.2 Hauora and Wairua*

Hauora, as presented in the NZC, is a Māori philosophy of well-being based on Professor Sir Mason Durie's Te Whare Tapa Wha model (Durie, 2009). Durie introduced Te Whare Tapa Wha as a Māori worldview conception of wellbeing alternative to that of the hegemonic European conception of wellbeing as health, as follows:

> The prevailing view, that health was a universal concept, transcending culture, gave little recognition to the fact that the 'norm' was actually based on Eurocentric philosophies, culture and methods. Maori health perspectives challenged the mono-cultural assumptions and introduced other ways of considering health. 'Te Whare Tapa Wha', for example, was a construct that compared good health to the four sides of a house with balance between spirituality ('taha wairua'), intellect and emotions ('taha hinengaro'), the human body ('taha tinana') and human relationships ('taha whanau')
>
> (p. 249)

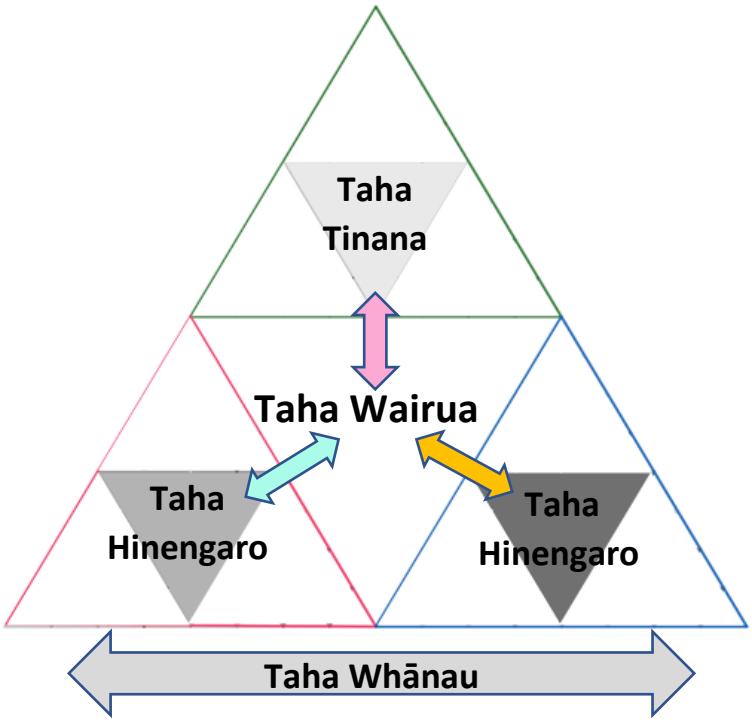
As with Nussbaum's (2003) conception of human capabilities, all dimensions are necessary in harmony for personal power and balance (O'Toole et al., 2019). According to the NZC, "Hauora and well-being, though not synonyms, share much common ground" (NZ Ministry of Education, 2007). While the inclusion of hauora in the curriculum is an acknowledgement of Māori perspectives, its treatment there is extremely brief and lacks any wider cultural context. Heaton (2018) warns against simplistic interpretations of Māori concepts which overlook their true complexity and connections with Māori ways of knowing, and what they might offer education:

> For example, hauora is referred to as the supernatural hau (breath) of ora (life) given to Hine-ahu-mai-i te-one (the first feminine form). Hau (wind or vital essence of life), ha (breath), ora (to be alive, healthy, to survive) and wairua (spirit) were infused into the first feminine form, the progenitor of humanity to animate life. If hauora can indeed be described as the animation of life, then it delivers a formidable edict to a curriculum or learning area, which may not have the metaphysical tools to meet it. (p. 461)

In Figure 2-10 I have mapped my interpretation of Durie's (2009) four sides of hauora onto a TSF representation corresponding with the three domains and central attractor of the SWM Individual-Interpersonal level illustrated in Figure 2-8. I have represented Taha Wairua as most closely related to the SWM concept of the integrating self.

Taha tinana parallels the domain of Active-physical well-being while taha hinengaro relates to both feeling/affective and thinking/cognitive well-being. Taha Whānau/extended familial wellbeing relates most closely to the Dynamic-Egalitarian lower layers of the complex social networks that lie between the individual-interpersonal level and the Hierarchical Dominance networks of the Social Justice domain of the Human-Societal level of the SWM framework, shown in Figure 2-7. The concept of fractal layers and levels is explained in more detail in Section 2.6.2. By the fractal self-similarity principle, all three domains of the individual plane will be present in any social structure or domain at higher levels. I have therefore represented Taha Whanau in Figure 2-10 as contributing to and dependent on healthy interconnections among all the three other sides of Hauora.

*Figure 2-10 A mapping of the elements of Hauora as interpreted in Durie's (2009) Te Whare Tapa Wha model onto a Triadic Sierpinski Fractal (TSF) representation*




The Māori concept of wairua or wairuatanga comes closest to the Western concept of spirituality, soul, or spirit (Mead, 2003; NZ Ministry of Education, 2007 glossary; Rameka, 2015; Valentine et al., 2017). The SWM embraces the interpretation of wairua as two (rua) streams (wai)—physical and spiritual, objective and subjective—merged into one river (Rameka, 2015), the one reality of experience, in contrast to Western culture's dualistic habits of thought and perception, and its positivist attachment to objective reality as being more real than the subjective. In the SWM framework, the central triangle at the Individual-Interpersonal level represents the intangible mystery of the integrating self. The TSF (as developed in Section 2.6.2, Figure 2-16) represents this intangible potentiality as present not only at the 'centre' of a complex entity but also throughout the framework in the white triangular spaces included at every level.

### *2.4.7.3 Matāuranga Māori and Complexity thinking*

From a Western hegemonic point of view, holism amounts to reconstituting or synthesising a whole from its essential parts as identified through clearly defined concepts. By contrast for the traditional Aotearoa New Zealand Māori worldview and for many other indigenous cultures and religions, holism is the existing condition of the cosmos with human beings inextricably part of that wholeness. As such, "The individual self-identity is not distinct from the surrounding world. There often is no separation of mind and matter. Traditional knowledge is an integrated system of knowledge, practice and beliefs" (Berkes et al., 1994, p. 283). In her discussion of the notion of (spiritual) holism as applied to mental illness, Southey (2020) argues that Māori and other Indigenous explanations of Being have themselves been affected by the Western scientific expectation that "things will be represented as objects with

conceptual clarity; making them present to the rational self who can take things up as thinkable phenomena" (p. 23). This preoccupation with knowledge as only that which can be explained in words denies the essential mystery of being, including of being human and also the extent of our ignorance. This view of beings is congruent with the complexivist view of all living things as self-organising adaptive systems with unique agency.

Southey (2020) also notes the congruence between the motifs and symbolism used in Māori art and carving and the recognition of self-similarity and fractal patterns in complexity thinking, referencing the fern leaf as I have done in Figure 2-4 and a triangular fractal-like pattern reminiscent of the Sierpinski triangle shown in Figure 2-3. This pattern is called 'Te Niho o te Taniwha, The teeth of the Taniwha', by Rout et al. (2022) in their report *Te Niho o te Taniwha: The teeth of the Taniwha. Exploring present-future pathways for whānau and hapū in Māori economies of wellbeing*. Neither Southey nor Rout et al. attempt to develop the potential meta-connective symbolism of the TSF as I do in this study. The latter, however, does explain the symbolism of the Taniwha in a way that is congruent with the concept of a socio-cultural attractor in the sense that I propose for the SWM as an alternative vision of education:

> As part of our exploration, we have chosen the taniwha as our tohu [symbol, emblem, landmark, signature]. Taniwha, in this sense, may be a guide to a hopeful future or a symbol of destructive force. (Rout et al., 2022, p. 4)

A taniwha can also be understood "as denoting a guardian being or an idea whose time has come" (Joseph & Benton, 2021, as cited in Rout et al., 2022, p. 4). For the current BaU configuration of the education system attractor, the Sustainable Wellbeing Metacurriculum may prove to be at the very least disruptive and even ultimately its replacement.

## 2.4.8 Sustainable Wellbeing

### *2.4.8.1 Beyond both Sustainability and Wellbeing*

The phrase 'Sustainable Wellbeing', I argue, has a semantic power, and potential to inspire that other superficially similar terms do not for the following reasons.

- The word 'Sustainability' has an unambiguous dictionary definition and is worth rescuing from conceptual degradation by commercial appropriation.
- The phrase 'Sustainable Wellbeing' has an advantage in that in most people's minds 'Wellbeing' is associated with more than material wealth and GDP per capita.
- The word 'Wellbeing' means many things to many different people. Using it in conjunction with 'Sustainability' demands an ongoing public aspirational conversation about what it can mean to individuals and for humanity as a whole.
- By adding 'Wellbeing' to Sustainable, we make clear that we do not intend to sustain systems in a state of ecological depletion, poverty, or ignorance.
- Although 'Climate Change' Education and Education for 'Sustainable Wellbeing' refer to very similar curricula in the education literature, in most citizens' minds the former is more likely to be associated with the physical causes of global warming and consequences of anthropogenic greenhouse gas emissions only, and not also with the Social structural and Cultural transformations roots of 'Sustainable Wellbeing'.
- The two words put together mean more than the sum of their separate meanings.

One interpretation that emphasises the elimination of damage sees 'Sustainable Wellbeing' as "the promotion of wellbeing that does not come at a cost to other people or the natural environment" (O'Brien, 2016 cited in Wilkie et al., 2022, p. 3). The case for Wellbeing as the proper target of Sustainability education is exemplified by Barnett's (2013) aspirational ideal of the ecological university:

> The ecological university would be a university embarked on a process of its own becoming, guided by the ideas of sustainability and wellbeing. The concept of sustainability is here oriented towards the sustainability of the university's multiple ecologies—personal, institutional, cultural, global, physical, and social. ...However, the ecological university would not be content in rooting its self-understanding in the concept of sustainability, for it would want especially to embrace the concept of wellbeing. This is a much more demanding concept than sustainability, for whereas sustainability stays within present understandings of natural states, wellbeing can always be improved and its very definitions can always be advanced.
>
> (Barnett, 2013, p. 113)

#### *2.4.8.2 Cynicism*

The dominant current discourses around the meaning of human wellbeing focus on the individual and the satisfaction of their preferences through market-based mechanisms (Scott, 2012). Gasper (2007) suggests that sustainability may be best promoted by appealing to people's enlightened self-interest, i.e. a shift from emphasising material excess to survival, social and self-actualization values, rather than appeals based on intra or intergenerational justice. However, despite the evidence cited in Section 2.4.5.2 that subjective wellbeing and material wealth are only correlated up to a certain point, as Dresner (2003) wryly observes:

> It is a truth that was pointed out [long ago] by Buddha and then by Jesus. Yet over two millennia, this knowledge has failed to prevent consumerism from replacing both Christianity and Buddhism as the religion of both Europe and East Asia.
>
> (p. 171)

The Anthropocene and Climate Change, however, present all humankind with a new, global and inescapable level of consequence for consumerism that is forcing a re-evaluation of enlightened self-interest in terms of Sustainability and Wellbeing as global and mutually implicating. This re-evaluation is likely to impact psychological wellbeing, especially in developed nations, in ways unprecedented in the modern era. Scott (2012) finds it "almost impossible to conceive of a different way of constructing human wellbeing which would not only compromise deeply held normative beliefs but also challenge our basic comprehension of what it means to be human" (p. 49). The concept of sustainability, she argues, ultimately asks us to change the way we conceive of the self. For Westerners, at least, these conceptions may be beyond our power to imagine without the assistance of alternative and particularly Indigenous understandings of the self more connected with Nature.

The concept of 'sustainable global citizenship' (Granados-Sánchez, 2023) suggests we foster a multi-level understanding of ourselves "as citizens of a nation-state, as global citizens, as employees, as consumers and as members of many territorial and non-territorial communities" (p. 18). It is an example of such a reimagination of the self that extends its boundaries to include the global

community and ultimately the whole Biosphere. These insights are of particular relevance to the SWM conception of the 'Integrating Self' as the attractor responsible for Sustainable Wellbeing at the Individual-Interpersonal level.

#### *2.4.8.3 Eco-Anxiety*

There is something in the tone of Scott's conclusion—that a realisation of what is at stake in the Anthropocene challenges our basic comprehension of what it means to be human—which suggests, at least to this reader, a sense of disbelief mixed with pain, something akin to immanent grief. Experiencing the grief of fully understanding the implications of climate change and environmental destruction may be a prerequisite for teachers, students, and communities who undertake leadership in education for strong sustainability (Verlie, 2019). Yet, eco-anxiety and grief alone do not necessarily lead to adaptive behaviour change (Clayton & Karazsia, 2020). As Verlie (2019) also concedes, "research into people's emotional experiences of climate change show that many people fail to respond to climate change not because of a lack of concern, but because of their concern" (p. 752).

In their interviews with youth climate-strike activists in New Zealand, Bright and Eames (2020) found that:

> The participant climate strike leaders frequently reported their journeys as ricocheting through various emotional stages including apathy, awareness, anxiety, and anger before they were moved to action. They suggested the varying stages had the potential to disengage or motivate students.
>
> (p. 14)

Bright and Eames (2020) point out many secondary school students do not have "the physical or emotional resources or motivation required to direct their anxiety and anger into action, but they could be guided by educators" (p. 20). The decisive insight arising from the literature appears to be that successful Sustainable Wellbeing education depends on students having the opportunity and adult leadership necessary to become aware of what our Sustainable Wellbeing crisis is, to experience the associated emotions, and to develop appropriate, agency. That agency can be nurtured through involvement in effective collective action which, in turn, generates the positive affect, courage and resilience needed to counter eco-anxiety, inertia, or defensive denial, which can then lead to new, pro-Sustainable-Wellbeing, worldviews. The actions can be political, artistic, or physical. The mode matters less than the heartfelt spirit with which they are undertaken. The success of Aotearoa New Zealand's Enviroschools movement has been attributed to its being "a programme with a heart" (Eames & Mardon, 2020). This quality of a path with a heart might be the essence of the choice between transformative education for Sustainable Wellbeing and education for the continuation of BaU. However, before we can transform a system with such massive inertia and entanglement with BaU, as secondary schooling, we must understand its current state and how it arrived where it is now in 2024.

## 2.5 The Politics of Curriculum

### 2.5.1 Section Overview

In this section, I begin with the question 'What is Curriculum?', and review the literature on curriculum, and its relationship to pedagogy and assessment in the Western educational currents of the last 100—150 years. I discuss the unavoidably political nature of curriculum theory and how that

manifests in what is often presented as an irreconcilable opposition between the traditional disciplinary Collection and the progressive transdisciplinary Integrated curriculum types. In Aotearoa New Zealand curriculum policy is enacted through the New Zealand Curriculum (NZ Ministry of Education, 2007) (NZC) and the National Certificate of Educational Achievement (NCEA) accreditation system. The section closes with a review of how these two instruments have evolved over the last twenty years without resolving their inherent disciplinary–transdisciplinary tension.

## 2.5.2 What is Curriculum?

*Introduction to Curriculum and Curriculum Theory*

'Curriculum' generally refers to the knowledge included in teaching and learning programmes, that is considered "of most worth" (Spencer, 2009, p. 5), within a certain locale and cultural setting. A curriculum is normative and inescapably value-laden. The unavoidably political nature of curriculum design has been well-recognised since at least the 1990s. As Pinar et al. (1995) observe:

> Today no serious curriculum scholar would advance the argument that schools in general and curriculum in particular are politically neutral. Yet the political neutrality of school curriculum was a commonplace assumption in the pre-1970s literature.
>
> (p. 244)

Spencer's short answer to the question "What knowledge is of most worth?" was—"science" (2009, p. 6). Whereas Spencer may have understood knowledge as being about an objective and progressively discoverable reality, John Dewey, writing in the 1930s, had a transactional, less content-oriented, and more cross-curricular understanding of knowledge and curriculum (Biesta, 2014). In stark contrast to Dewey's transactional view of curriculum was Ralph W Tyler's instrumentalist and utilitarian approach which set out four fundamental questions to guide curriculum construction:

> 1. What educational purposes should the school seek to attain?
> 2. What educational experiences can be provided that are likely to attain these purposes?
> 3. How can these educational experiences be effectively organized?
> 4. How can we determine whether these purposes are being attained?
>
> (Tyler, 1949, p. 51)

Tyler, unlike Spencer, and potentially in harmony with Dewey's democratic ethic of education, made it clear that it was not his role to answer these questions, writing "No attempt is made to answer these questions since the answers will vary to some extent from one level of education to another and from one school to another" (1949, p. 51). Tyler was also more moderate in his view of the influence of disciplinary specialists on secondary school education, "on the grounds that the objectives they propose are too technical, too specialized, or in other ways are inappropriate for a large number of the school students" (p. 56). He suggested that rather than preparing students for later advanced studies in their particular fields, curriculum specialists at this level of education should focus on the question:

> What can your subject contribute to the education of young people who are not going to be specialists in your field; what can your subject contribute to the layman, the garden variety of citizen?
>
> (Tyler, 1949, p. 56)

While Tyler's questions one and two are equivalent to "what knowledge is of most worth?", questions 3 and 4 are more suggestive of a scientific prescriptive approach to curriculum design foregrounding assessability and accountability. Quinn (2019, p. 4) describes the "predominant Tyler Rational" as leading to a "linear, predetermined, pre-set curriculum". Tyler's view of curriculum dominated the latter half of the 20th century and its neo-Tylerian successors continued to dominate in the first two decades of the 21st century (Bailey et al., 2019), although to a decreasing extent.

The influential American curriculum theorist William F. Pinar, like Dewey, stresses subjectivity and the immediacy of the student-teacher relationship in education. What is worth learning for Pinar is what leads the student to self-formation. Pinar devised the method of currere to "underscore a concept of education as self-formation through academic study" (Pinar, 2012, p. 24). Currere is the verb form of curriculum and means 'the running of the course'. Currere positions curriculum as the study of "the relations between academic knowledge and life history in the interests of self-understanding and social reconstruction" (p. 25). Currere reimagines curriculum as something more akin to a personal spiritual journey than Tyler's seemingly algorithmically determined sequence of discipline-based educational experiences.

The relationship between disciplinarity and interdisciplinarity is particularly relevant for a metacurriculum that places such an intrinsically transdisciplinary, cross-curricular objective as Sustainable Wellbeing at its heart. The metacurriculum must be able to address local and global Sustainable Wellbeing issues without being distracted by the epistemic priorities of disciplines. Disciplinarity and interdisciplinarity are required complementary elements in curriculum development, as Morris concludes:

> The relationship [between disciplinary and interdisciplinary work] is often depicted as an opposition, a paradox, or a dichotomy, … Close inspection of boundary crossing Disciplinarity and Interdisciplinarity reveals that disciplinarity and interdisciplinarity are productive tensions in a dynamic supplement, complement, and critique.
>
> (Klein, 1996, cited in Morris, 2017, p. 199)

For the SWM, all approaches to knowledge and forms of pedagogy remain at the service of humanity's Sustainable Wellbeing, but they cannot claim the status of a superior means of educating in their own right. Knowledge of 'Sustainable Wellbeing' is the knowledge of most worth.

In the following sections, I explore how the apparent opposition of Subject-Based Specialist (SBS) and Cross-Curricular Holistic (CCH) oriented curriculum designs features in the ideological debates between their proponents, and how the complementarity of this false dichotomy might be realised in actual school timetables which integrate the two curriculum modalities. First, though, it is necessary to clarify, if possible, the distinctions among the various forms of not-strictly-disciplinary teaching that appear in the literature, and their relationship to traditional secondary school subjects.

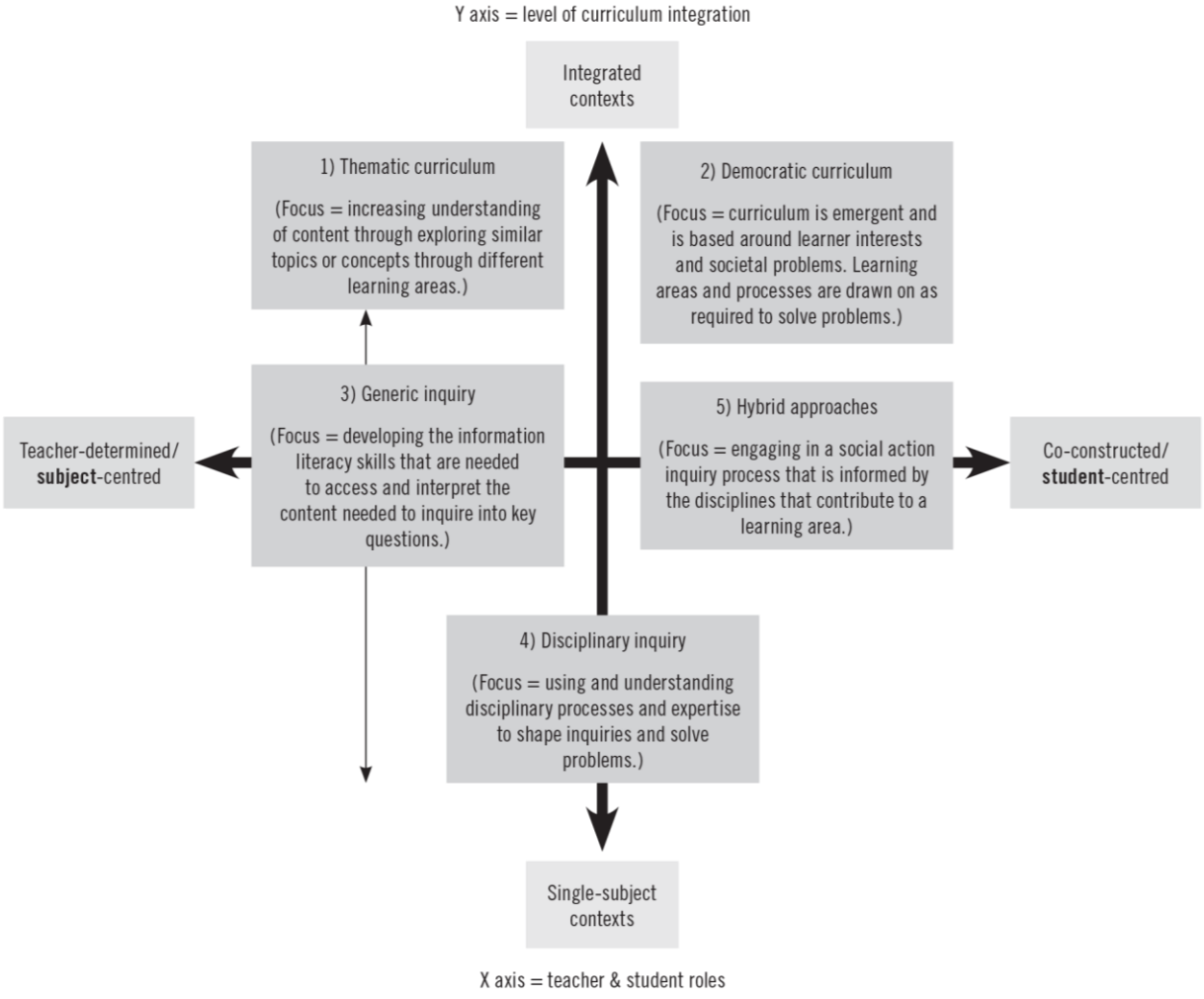
*Forms of Cross-curricularity.*

As Mård and Klausen (2023b) observe, "crosscurricular teaching is an approach traditionally characterized by terminological unclarity. A bewildering variety of terms and concepts are used, partly to express different conceptions or describe different types of teaching, partly reflecting different traditions and terminological habits" (p. 7). Some commonly used terms include Student Inquiry,

Curriculum Integration, Interdisciplinary, Multidisciplinary, Cross-Curricular, Transdisciplinary, Transcurricular, Bildung, and Holism, any or all of which could be used within the scope of an SWM.

Based on their study of integrated curriculum and student inquiry in primary and secondary schools, up to years 9 and 10 (14 and 15-year-olds), Boyd and Hipkins (2012) devised a two-dimensional diagram to contrast and compare five different typical approaches, as reproduced with permission in Figure 2-11. The vertical dimension of their diagram represents the level of curriculum integration (i.e. from single subject below to multi-subject integrated contexts at the top). The horizontal dimension represents a continuum of Teacher and Student roles from Teacher-determined/subject-centred on the left to Co-constructed/Student-centred on the right. Boyd and Hipkins (2012) note they found no examples of integrated or inquiry approaches in the literature that were purely student-directed.

*Figure 2-11 One view of the intersection between integrated and inquiry approaches (Boyd & Hipkins, 2012)*




Of the five approaches to Integrated Inquiry Boyd and Hipkins (2012) describe, their 'Democratic Curriculum', at the top right of their diagram is closest to the SWM's CCH mode while 'Disciplinary Inquiry' at the bottom centre is closest to the SWM's SBS mode. James Beane's definition of curriculum integration is perhaps the best known. Beane defines curriculum integration as:

> … a curriculum design that promotes personal and social integration through the organization of curriculum around significant problems and issues, collaboratively identified by educators and young people, without regard for subject area lines.
>
> (Beane, nd, cited in Boyd & Hipkins, 2012, p. 19)

In this definition, students' concerns about self and society are established first and "then woven together in themes such as living in the future or conflict. Curriculum areas are drawn on as they become useful for a study" (Beane, 2002, cited in Boyd & Hipkins, 2012, p. 19). The 'Democratic Curriculum' is in stark contrast with the 'Thematic Curriculum' approach—in the top left of Figure 2-11—where the focus is on increasing understanding of subject content through exploring similar topics or concepts across learning areas, with no regard to the social significance of the themes. For example, concepts such as sustainability or topics such as dinosaurs are considered equally educative if they can be used by two or more subject areas simultaneously to further their separate subject-based content priorities.

'Disciplinary Inquiry', which is the closest of these five Inquiry-based approaches to the SWM's SBS mode, was founded by Jerome Bruner and others in the 1960s. Bruner, like Dewey, favoured learning by doing but within a disciplinary context. The term 'scaffolding'—meaning the guidance teachers provide in supporting students' cognitive development toward becoming independent learners—originated with Bruner (Boyd & Hipkins, 2012). Critics of the approach "point out that just doing a science investigation won't mean that students discover knowledge-building conventions in science without expert guidance" (p.21). In contrast also to the SWM's SBS mode, 'Disciplinary Inquiry' does not appear to include explicit teacher-led instruction as a powerful available pedagogical strategy when judiciously and appropriately used.

Like Boyd and Hipkins (2012), Thorburn (2017) makes his main distinction about approaches to non-disciplinary versus disciplinary approaches based on whether the focus of the teaching is on cross-curricular themes at one extreme or the priorities of individual disciplines at the other. Both authors put Dewey and Beane's Democratic curriculum at the highest level of curriculum integration but whereas Boyd and Hipkins (2012) contrast the Democratic curriculum integration with 'Disciplinary Inquiry'. Thorburn (2017) contrasts it with interdisciplinary enquiry. The former, he writes, is based "on accommodating and assimilating new holistic experiences in shared social contexts, relative to the latter where the focus is on recognising to a greater degree the disciplinary status of subjects" (p. 247).

Of particular relevance to the SWM are the meanings attached to the terms theme-based/thematic. Mård and Klausen (2023b) distinguish between the typical primary school use of themes and their related but deeper treatment of thematic practices in high school in a way that is consistent with Thorburn's(2017) understanding. Theme-based or thematic, they write:

> Refers to a more intensive way of working with a common theme, and the subjects involved need to be carefully selected to essentially deepen the understanding of the theme and to itself be better understood through application to the theme.
>
> (Mård & Klausen, 2023b, p. 14)

Closer still to the holistic ideal envisaged for the co-construction of the SWM subdomains are project-based; problem-based; and phenomenon-based practices that fall under the heading of

transcurricular teaching. Ideally, such practices will be tied to the commitment of the whole school community to ongoing projects, such as the school garden and healthy school meals programme, the restoration of, and care for, local wildlife habitats, or long-term missions such as energy self-sufficiency, net zero campus carbon emissions, and zero waste to landfill. Projects around social well-being in the local community, contributing to local government planning, and cultural projects aimed at improving race relations and envisaging a future of greater sustainable wellbeing, mean that teachers from all disciplinary backgrounds could and ideally need to be involved in the CCH mode, most likely working in teams. 'Holism' for Mård & Klausen (2023a):

> … refers to the need of decompartmentalizing education to help students explore phenomena from the viewpoints of multiple subject perspectives. The ideas of authenticity and contextuality accentuate the importance of exploring real-world phenomena existing within tangible time and space, rather than engaging with only theoretical or hypothetical ideas. Through problem-based inquiry, students explore the phenomena by identifying and investigating possible problems.
>
> (2023a, p. 15)

The CCH mode of the SWM effectively gives Sustainable Wellbeing the status of a pandisciplinary epistemic structure in its own right. As argued in Section 2.2, Climate Change is a symptom of humanity's disconnection from nature, from social justice and from itself. Climate Change is a sign of how urgently we need to address the inadequacy of our existing 'sophisticated' dominant anthropocentric worldview. Allowing Climate Change education to be addressed by individual subject areas in isolation could lead to an underestimation of its significance, and a lack of clarity and fragmentation in its teaching (Eilam, 2022; Sjöblom et al., 2023). As discussed in my Introduction, the same argument applies to Education for Sustainable Wellbeing.

*Bernstein's: Collection vs Integration Curriculum types*

Thus far I have focused on clarifying how I use the various terms for cross-curricular teaching that appear in the literature, as they relate to the CCH mode of the SWM. Now I turn to the role of the SBS mode of the SWM and the challenge of bringing the two modes into a productive complementary relationship within the secondary school timetable.

Bernstein (1975) identified a fundamental axis for curriculum design as lying between two broad types of curricula, 'Collection' and 'Integration' (p. 71). The Collection type is most closely related to what I have called the SBS mode of the SWM and the Integration type is closest to the CCH mode, but neither fits simply into Bernstein's schema. Bernstein (1975) characterised the essential distinction between the Collection and Integration types of curricula in terms of two properties he called Classification and Framing. Classification "is the insulations, the boundaries between things, be they relationships internal to the individual, or external" (p. 11). Framing "refers to the form of the context in which knowledge is transmitted and received. Frame refers to the specific pedagogical relationship of teacher and taught, and the strength of the boundary between what may be transmitted and what may not be transmitted, in the pedagogical relationship" (p. 80). Hence Classification is equivalent to Boyd and Hipkin's (2012) dimension of 'level of curriculum integration' and Framing to their dimension of 'Teacher and Student roles' in Figure 2-11.

For Bernstein (1975), the 'Collection' type curriculum has strong Classification and Framing while the 'Integration' type has weak Classification and Framing. The SWM is more complex. As it emerged in this study, the SWM SBS mode is also likely to have strong classification and framing relative to the

SWM CCH mode given their complementary roles, yet in sync with the needs of the CCH lessons at the same year level, not insulated from them; something like Boyd and Hipkin's (2012) Generic or Disciplinary inquiry.

The CCH mode courses and lessons—given the fractal structure of the SWM Domains and Subdomains—will be weakly classified in disciplinary terms but clearly 'navigable' for teachers and students in terms of the SWM framework while their framing is likely to vary fluidly within and between lessons according to the development of each course and its domain context; somewhat like a variable mix of Boyd and Hipkin's (2012), Generic inquiry and Democratic curriculum. SWM CCH mode Courses/Teaching Units did not appear to be examples of 'thematic' or 'hybrid' curricula in terms of Boyd and Hipkin's (2012) diagram. The Thematic curriculum, while integrating, does not appear to prioritise socially significant themes over its main priority of subordinating the themes and to its coordination of multidisciplinary learning objectives. The Hybrid approaches encourage socially significant themes but only among the subjects within learning areas, rather than across the curriculum, as subdomains of the SWM are likely to require.

### 2.5.3 Twenty-First Century—Future-Focused Education versus Powerful Knowledge

*Harmonising Integrated and Collection types through enabling constraints*

Berstein (1975) sees the Collection and Integration curriculum types as social structures that are necessarily in conflict, with the latter being a deliberate attempt to transform the former. The first favours analysis, while the latter prefers synthesis. From an SWM perspective resolving the conflict between the Collection and Integration curriculum types—between the SBS and CCH modes of the school timetable—is fundamental to its reason for being and at the heart of my main research question. How is this to be achieved? One line of approach to this question is to consider each modality's weaknesses and to address those fallibilities using the principle of enabling constraints from Complexity theory.

Bernstein lists four conditions that an integrated curriculum must fulfil if its openness is not to degenerate into a sense of purposelessness and dislocation in time and place for faculty and students. These conditions would have to be met by the CCH mode of the SWM to maintain its coherence but also a coherent complementary relationship with the SBS mode. They are:

1. There must be some consensus about the integrating idea if it is to work at all and the idea must be made very explicit.
2. The nature of the linkage between the idea and the several contents must be systematically and coherently worked out.
3. A committee system of staff and pupils has to be set up in order to develop a sensitive feedback control on the whole endeavour.
4. Of greatest importance, very clear criteria of evaluation must be worked out.

(1975, p. 75)

What might a similar list of conditions look like for a Collection-type curriculum if its closedness is not to degenerate into rigid disciplinary silos and an experience of irrelevance, anxiety and loss of agency for faculty and students in the face of the accelerating global poly-crisis? John Dewey's attitude toward disciplinarity provides useful insights. The claim that the value of traditional educational practice lies simply in its being 'disciplinary', is an "error" in two ways, according to Dewey (1916). First, the claim has been used to shield disciplines from critique and useful revision:

> It has not been enough to show that they were of no use in life or that they did not really contribute to the cultivation of the self. That they were 'disciplinary' stifled every question, subdued every doubt, and removed the subject from the realm of rational discussion.
>
> (Dewey, 1916, p. 85)

Second, the claim has contributed to a counterproductive association of 'discipline' with an ascetic-like application of will or agency, to tasks and learning that are of no immediate interest or relevance to the student, rather than enthusiasm for achievable desirable outcomes. From the perspective of power relationships, classification and framing, this understanding of 'discipline' can further degenerate into being no more than training in uncritical compliance. From this pedagogical standpoint:

> Application just for the sake of application, for the sake of training, is alone disciplinary. This is more likely to occur if the subject matter presented is uncongenial, for then there is no motive (so it is supposed) except the acknowledgement of duty or the value of discipline.
>
> (p. 85)

Criticism of these counter-productive expressions of 'discipline' should not be taken to mean that willful application to challenging tasks, hard work, practice and learning predicated on the achievement of future goals is of no educational value, only that those goals should be visible and meaningful to the student. From a twenty-first-century teacher's perspective, such punitive approaches to discipline through curriculum may seem to belong to a dark and distant nineteenth-century past. The challenge of achieving student engagement through intrinsic motivation remains however and the twenty-first-century practice of motivating students extrinsically through credits for standards-based assessments does not necessarily come any closer to Dewey's ideal form of acquiring discipline through enthusiasm.

What list of conditions then, ought to be placed on Collection-type curricula and thus also on the SWM SBS mode? In Section 7.3.4 I return to this question to offer an answer in light of this study's findings.

*SRPK learning and curriculum*

In this section, I briefly explore the political ideological struggle between the conservative and the progressive curriculum traditions as it has emerged in the twenty-first century. The conservative tradition is represented by the Social Realist—Powerful Knowledge (SRPK) school of thought, and the progressives by the Twenty-First Century—Future-Focused (21CFF) school. I argue that the battle between these views is not only counter-productive and unnecessary but it is also a distraction from bringing the particular strengths of both approaches to effectively and systematically address our shared Sustainable Wellbeing crisis through centring socially significant themes such as Climate Change.

Social realism has developed as a perspective amongst some sociologists of education over the last twenty years out of their concern that crucial issues around the organizing principles of knowledge, its production and change were being ignored in educational research (Hoadley et al., 2019). The term Powerful Knowledge (PK) was used by Michael Young (2009, p. 195) to distinguish the abstract, objective nature of academic school knowledge from everyday, context-bound, non-school knowledge. The more crucial distinction for the initial concerns of social realism, however, is in distinguishing PK—something which is powerful regardless of who possesses it—from the Knowledge

of the Powerful (KOTP), i.e. the "idea that the existing school curriculum represents the interests of those with power" (Muller & Young, 2019, p. 197). The children of the powerful get access to the sort of knowledge that keeps their families powerful and those of the disadvantaged will access knowledge that keeps them disadvantaged. From the SRPK point of view, PK is based on objective knowledge with well-established procedures of verification, while an opposing 21CFF view of knowledge is subjective and relativist informed only by postmodern and post-structuralist epistemology.

Consequently, a PK curriculum recognises that understanding of disciplinary knowledge requires that the curriculum be organized according to the epistemic structures of concepts in academic disciplines (McPhail & Rata, 2016). PK is consequently specialized and there exist definite, but not fixed boundaries, between disciplines and subjects which define their focus and objects of study. From an SRPK perspective, the organising principle of the 21CFF curriculum is located *outside* the concepts in the form of themes, topics, and projects rather than in disciplinary-based subjects (McPhail & Rata, 2016, p. 55, emphasis in the original). The social justice assertion and issue for proponents of the SRPK school is that students are sorted according to their perceived academic ability into either the PK academic or 21CFF everyday streams. All students, they maintain, are entitled to access PK and denying that access on the grounds that they "are not interested or find it too difficult [is] disturbing" (Young, 2013, p. 114).

Young and Muller (2010) use a three 'futures' scenarios schematic for differentiating the traditional positivist academic Tylerian (Young & Muller, 2010) model of curriculum (future 1) from the 21CFF model (future 2), and both from their ideal SRPK (future 3) model. Future 1 represents an "'*under-socialized* epistemology that defines knowledge as sets of verifiable propositions and the methods for testing them" (p. 14. Emphasis in the original). Subject boundaries are given and fixed. Subjects' associated social production processes (classification and framing) are implicit and unexamined. Future 2 represents an over-socialised view of knowledge that ends disciplinary boundaries, de-emphasises "the propositional character of knowledge and reduces questions of epistemology to 'who knows?' and to the identification of knowers and their practices" (p. 14). In contrast to both futures 1 and 2, future 3 sees;

> knowledge as involving sets of systematically related concepts and methods for their empirical exploration ***and*** the increasingly specialised and historically located 'communities of enquirers' with their distinctive commitment to the search for truth and the social institutions in which they are located
>
> (Young & Muller, 2010, p. 14 emphasis in the original)

Students should be made aware that the frontiers of knowledge are dynamic and that the disciplines are continually challenging existing ideas, updating them, and creating new knowledge. Boundary maintenance in this future is seen as "prior to boundary crossing and the variable relation between the two is the condition for the creation and acquisition of new knowledge" (p. 16). Young and Muller's three 'futures' scheme has proven both productive and popular (Morgan et al., 2019). The SRPK project has become a distinctive research tradition "in the United Kingdom, South Africa, Australia, and some Latin American and European countries" (Deng, 2020, p. 2).

In Aotearoa New Zealand, the 21CFF school of thought spread rapidly and significantly influenced the development of the New Zealand Curriculum (NZC) (NZ Ministry of Education, 2007). Since 2010, when New Zealand schools were required to have fully implemented the NZC (Schagen, 2011), interest in the SRPK-type curriculum from New Zealand-based scholars has increased (Johnston, 2022; Lipson, 2020; McPhail & Rata, 2016; Morgan et al., 2019; Rata, 2021; Rata et al., 2019) and now in 2024 has begun to influence educational policy directly since the change of government at New Zealand's 2023

general election (McLauchlan, 2024). In his critique of New Zealand's Innovative Learning Environment (ILE) model for school classrooms, Johnston (2022) explains that ILEs were conceptualised in part as "a vehicle for enacting a radical constructivist '21st-century learning' curriculum and an associated 'self-directed learning' pedagogical approach" (p. 6). Johnston's critique is informed by the SRPK perspective on curriculum which he explains;

> is explicitly at odds with '21st-century learning'. Even so, it is not precisely a 'traditional' curriculum philosophy, either; it explicitly recognises the risk inherent in the teaching of epistemic disciplines of an 'under-socialised' view of knowledge that fails to recognise the different cultural capital that students bring to school.
>
> (Johnston, 2022, p. 24)

While Young and Muller's Future 3 is poles apart from Future 2, the SRPK proponents face challenges in clearly separating the Future 1 traditional scenario from their Future 3 ideal (Morgan et al., 2019). The difficulties remain even though these authors distinguish Future 1 from Future 3 on both epistemological grounds—through the concepts of PK and KOTP which on closer examination may not be as distinct as they are presented (Beck, 2013)—and on social justice grounds, not by stated intent, but in terms of actual effect. The Future 3 approach has not solved the problem that most students cannot access Powerful Knowledge (Beck, 2013 cited in Morgan et al., 2019) due to what Young and Muller (2016, p. 159) term "epistemic disaffection".

Addressing this challenge is seen by SRPK writers as a matter of solving pedagogical shortcomings and students' choices or perseverance rather than as involving any problems associated with their PK conception of the curriculum itself. This rationale begins to sound very like the attitude of disciplinary pedagogues criticised by Dewey (1916) for valuing discipline as a training of the will irrespective of the intrinsic interest of the student in the content. The challenge for social realists is to explain how academic knowledge seen as lacking relevance in the twenty-first century can be combined with a progressive pedagogy capable of engaging students in mastering that knowledge. "Realising this engagement without lessening the level of cognitive demand is a major pedagogical challenge identified by many writers" (Rata et al., 2019, p. 167). Perhaps the relevance of humanity's sustainability crisis could guide teachers' and students' engagement with knowledge, skills, and big ideas, regardless of the level of cognitive demand involved.

Arguably the strongest contribution of SRPK to curriculum theory is its view of the way powerful knowledge is constructed. PK is built as epistemic structures of ideas and concepts which develop;

> by being connected to other ideas and the application of these ideas in a specialised practice. These other ideas connect as internal referents to build patterns of ideas or concepts that refer one to the other in increasingly complex ways.
>
> (Rata et al., 2019, p. 166)

Systems of meaning are built which are bounded by their concepts' self-reference within the system and also to other systems of meaning. This is a view of knowledge congruent with complexity theory. But then, Rata et al. (2019) declare in a distinctly contra-complex systems manner that "The largest bounded system of meaning, which brings together concepts that can refer to one another in supportive ways, is the discipline itself" (p. 166). Rata et al. (2019) allow that connections can be drawn between disciplines "if required" (p.166), but cross-disciplinary research and learning depend on discipline-based knowledge. McPhail (2018) describes meta-concepts such as 'sustainability' or 'citizenship' as being strong pedagogical frameworks for learning but not part of any disciplinary

‘system of meaning’ or episteme. While I concur with McPhail's (2018) view of these meta-concepts’ pedagogical value I challenge his conclusion that for this reason, they cannot be the starting point for the exploration of specialist subject-based content and concepts. The fact that meta-concepts are not currently systematically linked to existing disciplinary concepts and epistemic structures does not mean it cannot be done.

In considering the disciplinary checks and balances of 'fit to reality' testing, social realists overlook the limitations of these socially bounded procedures for making judgements of system-wide utility and relative value. For example, plastic packaging is a great fit for an economic system limited to the manufacturer-supermarket-households chain, but the relevant system for human and biospheric wellbeing includes the environmental sources and sinks for the extracted raw materials and all that long-lived eventual pollution. Disciplines, in limiting knowledge to 'knowledge that' and 'knowledge how' within their limited disciplinary domain, neglect the more engulfing and ultimately more relevant system-wide social questions of ‘knowledge why', or 'why-not'.

The last and perhaps most revealing aspect of the SRPK three futures scheme I will mention is its curious minimal reference to sustainability crisis issues that are a feature of the 21C future-focused curriculum. Young & Muller (2010) for instance, use the word ‘sustainability’ only once in their original *Three Educational Scenarios for the Future* article, in a quote designed to illustrate the over-socializing trend in contemporary educational thinking. The social realists appear to be attempting to reclaim the word ‘future’, so evocatively employed by the Future-2-ists, and to define their version of the future as a continuation of Western civilization’s steady past progress, only now with a social conscience and an emphasis on disciplinary fallibility and self-correction processes. The attempted co-option of some of Young’s thinking and arguments by policymakers advocating for a subject-based curriculum suggests that there may be only minor differences between future-1 and future-3, at least concerning the defence of the subject curriculum (Morgan et al., 2019). While Social Realists seek to downplay the role of politics in the production of knowledge, other groups arguing for the return to a knowledge-based curriculum, such as the UK based ‘Academy of Ideas’ Morgan et al. (2019) argue, have a purposeful political agenda which frames “‘sustainists’ (i.e. those in favour of sustainability) as the ‘enemies of progress’” (p. 112). The SRPK attitude toward global sustainability issues is consistent with their view that schools are limited in what they can do directly about influencing political realities outside the school, but do have the opportunity, within the school, to more fairly give students access to this valuable knowledge resource (McPhail & Rata, 2016). Maintaining strong boundaries between schools and the wider community provides a rationale for not having to confront the sustainability crisis and the interdependence of its environmental, social, and cultural domains.

*21CFF learning and curriculum*

Twenty-First Century Future-Focused (21CFF) learning and curriculum could be described as the continuation of the twentieth-century progressive, integrated curriculum movement in education with a greater emphasis on preparing students for a future that no longer looks as predictable or manageable as it once was. According to the International Commission on Education for the 21st Century, chaired by Jacques Delors from 1993 to 1996, to meet the challenges of the twenty-first-century education must be organised around four pillars that align well with the SWM individual and inter-personal domains and their Integrating-Self attractor:

1. Learning to know, that is acquiring the instruments of understanding;

2. Learning to do, to be able to act creatively on one’s environment;

3. Learning to live together, so as to participate and cooperate with other people in all human activities; and

4. Learning to be, an essential progression which proceeds from the previous three
(Leicht et al., 2018, p. 90)

Bolstad et al. (2012, p. 1) describe 21CFF as "not a fixed prescription or known formula" but rather as "an emerging cluster of new ideas, beliefs, knowledge, theories and practices". Six emerging themes of 21CFF in the Aotearoa New Zealand context are identified by the authors: personalised learning; new views of equity, diversity, and inclusivity; using knowledge to develop learning capacity; rethinking learners' and teachers' roles; continuous learning for teachers; and new kinds of partnerships and relationships between schools and community (in contrast to the SRPK insistence on strong boundaries between school and non-school knowledge). Knowledge is seen as valued for what it does, more like a verb, rather than (just) as content, more like a noun, a view of knowledge that resonates with Dewey's pragmatism. A 21CFF curriculum is seen as more holistic involving integration and inquiry learning guided by vision, values, and principles that include the potentially rich learning opportunities provided by future-focused issues such as sustainability, citizenship, enterprise and globalisation (Boyd, 2013). The emphasis is on building students', teachers', and schools' capacities to adapt to the rapidly increasing pace of change that is the reality of our immediate future and on the ability of students, teachers, and schools to contribute to knowledge development, without losing sight of the value of attaining that deeper, less transient knowledge and learning known as wisdom.

Accounts of the progress of the influence of 21CFF ideas on mainstream education tend to depend on which side of the progressive/traditional political divide the commentator identifies with and also on what aspects of the 21CFF programme they choose to focus on. Gilbert (2019) observes that even though "future-focused" rhetoric is everywhere in education, particularly in policy contexts, its effect on the knowledge schools teach and their systems has been superficial and the "vast majority of educational research continues to focus on improving the effectiveness of existing educational practices" (p. 262). In their study of national education systems in Singapore, China, Chile, Mexico, India, and the US state of Massachusetts, Reimers & Chung (2016) found limited evidence of large-scale implementation of twenty-first-century education.

Young and Muller (2010) on the other hand, described 21CFF education (their Future 2 scenario) as "learner-directed trends, coupled with the wider introduction of digital technologies" (p. 18), and see them as "everywhere gaining ground in Europe and beyond" (p. 18) despite meeting resistance from the forces underpinning the traditional, under-socialized subject bounded education (their Future 1 scenario). They associate this trend with the de-professionalisation of teaching at all levels and the de-specialisation of research. In New Zealand the advance of "child-centred orthodoxy led by the Ministry of Education and parts of the "research" community (emphasis in the original), has been extraordinary by international standards, controlling the official discourse about schooling over the last 30 years, according to knowledge-based education advocate Briar Lipson (2020).

One of the main advantages of the 21CFF model of education claimed by its proponents is that it is intrinsically more engaging and likely to lead to persistent learning than the established disciplinary alternatives, including the SRPK model. Wan and Bi (2020), for instance, attribute Chinese school students' increasing disaffection for science as they grow up through the grade levels, to the subject being too focused on its inert subject knowledge and not enough on its social implications. Anecdotal evidence for increased student engagement and learning certainly can be found. McDowall and Hipkins (2019) report that many teachers included in their study of 21C integrated curriculum "considered that most (but not all) of the students they taught were more engaged in the approaches they were trialling than previous approaches and that this was particularly true for students who had

previously struggled to engage in learning" (p. 5). A recently completed research project with Year 9 students at two Aotearoa New Zealand secondary schools developing the discourses and practices of different learning areas through a project on ecological sustainability (Matthewman et al., 2017) found "evidence of positive shifts in students' understanding and use of the targeted discourses and practices and their sense of sustainability identities" (McDowall & Hipkins, 2019, p. 12).

*The Sustainable Wellbeing Metacurriculum as both Disciplinary and Cross-Curricular Holistic*

The opposition between the conservative Disciplinary Collection and progressive Transdisciplinary Integrated types of curricula is long-standing and according to scholars like Bernstein (1975) and Young and Muller (2010), irreconcilable. The Sustainable Wellbeing crisis with Climate Change as its leading edge, in particular, presents us with a unifying sufficiently imperative challenge and demands educators find systemic ways to harmonise this polarity and enable a Sustainable Wellbeing metacurriculum to emerge. The challenge, I argue, requires the Disciplinary SRPK proponents to grant disciplinary status to EfSW which includes Climate Change Education and it requires the Transdisciplinary 21CFF proponents to put cross-curricularity, competencies, and collaboration to work, to develop the epistemological structure and pedagogies needed to support this emerging meta-theme.

The framing of Climate Change or Sustainable Wellbeing which includes Climate Change, as topics, issues, or themes which must be somehow squeezed into the already overcrowded curriculum is due to an epistemological flaw in their conceptualisation, Eilam (2022) argues. The fact that Climate Change and other future-focused 'issues' have remained on the margins of the curriculum is that there has been no coordinated plan to treat them as a learning area in their own right and teachers are not prepared to approach the subject with any confidence in their expertise or feeling of specialised professional ownership. "If there were a need to choose one reason only for introducing CC as a disciplinary subject," Eilam writes, "this would most likely be it" (2022, p. 15).

Two further obstacles to the effective provision of EfSW are, first, its status regarding the amount of timetable space it is granted, and second, whether it is designated as a core or elective subject. Topics that are not specialised tend to be accorded low status within the curriculum and fewer hours within the timetable. Low-status topics tend to be elective and the lowest are crosscurricular (Ross 2000, cited in Eilam, 2022), 'crosscurricular' being used here in the sense of serving as a common context topic across two or more high-status subjects. High-status subjects also feature more prominently in assessments for accreditation and are allocated more resources and teacher professional development (p. 15). Both these obstacles would be removed by establishing Sustainable Wellbeing Education as a discipline in its own right but then another two appear. As Eilam observes "While disciplinary boundaries are always permeable and adaptable to new emerging understandings, some outline needs to be drawn as a circumference of the discipline" (Young, 2013 cited in Eilam, 2022, p. 14). According Sustainable Wellbeing disciplinary status would be to deny its complex transdisciplinary scope. Sustainable Wellbeing experts cannot erect boundaries around their subject since there is nothing, by definition, that it does not impinge upon. As a corollary, if Sustainable Wellbeing education is delegated to a group of specialists, teachers in other disciplines are likely to see it as no longer any of their business. While the SWM proposal establishes Sustainable Wellbeing as a discipline in its own right it also encourages subject teachers to connect their discipline with the SWM domains wherever possible.

Like Eilam (2022), Sjöblom et al. (2023) also argue that 'wicked' problems such as Sustainable Wellbeing, and the implications of climate change cannot be adequately addressed by individual teachers in traditional subject-based curricula. In an approach convergent with that of Eilam (2022), but from the integrated curriculum type perspective, they recommend education addressing 'wicked' problems based on a transdisciplinary core curriculum. Noteworthy in the following extract is the effectively opposite meaning they attach to 'crosscurricular' compared to that assumed by Eilam (2022), in the previous paragraph;

> Given their inherent complexity, wicked problems demand transdisciplinary approaches (e.g., Gibbs & Beavis, 2020; Kawa et al., 2021). Thus, conventional education alone cannot deal with such challenges, prompting researchers to call for multi-, inter-, and transdisciplinary educational approaches (e.g., Evans, 2015; Wolf, 2022), which in the school context entail multi-, inter-, and transcurricular teaching – that is, crosscurricular teaching.
>
> (p. 183)

Referencing the Finnish core curriculum for upper secondary school, they stress that a transcurricular approach encourages the development of students' agency and;

> can be realized as an optional thematic course designed locally and collectively by a team of teachers representing several subjects. Alternatively, a crosscurricular approach can be implemented by designing study units that include two to three existing courses from either the local or national curriculum that thematically work together.
>
> (2023, p. 190)

As an example of a successful transcurricular climate change education project, Sjöblom et al. (2023) cite one large-scale year-long collaboration among high schools and universities that involved "more than 100 experts from the climate change, environmental ethics, biology, and geology fields" (p. 187) cooperating with teachers and students. However, within the context of existing already crowded traditionally structured, subject-based timetables there is no simple way to facilitate transcurricular teaching in secondary schools. As Sjöblom et al. (2023) observe:

> An alternative for teachers is to collaborate with colleagues who teach other subjects and to discuss and plan the teaching together. However, collaboration and transcurricularity may be difficult to achieve for structural reasons such as unsuitable schedules and lack of time (Gullberg, 2022).
>
> (p. 193)

The SWM's CCH and SBS modes proposal is designed to overcome the shortcomings of both the purely disciplinary and purely transdisciplinary approaches to Sustainable Wellbeing Education. The SWM CCH mode grants Sustainable Wellbeing the status of a traditional high-status discipline by making it a core subject with a permanent reserved block of time in the timetable. The CCH and SBS timetable blocks are separated and made concurrent for all teachers and students. By keeping the two modes separated in time, scheduling clashes are avoided. The CCH mode can then also avoid the traditional content-isolating rule of disciplinary collections that "things must be kept apart" (Bernstein, 1975, p. 9) through its transdisciplinary fractal domain structure that follows the rule "Things must be put together" (1975, p. 9). To achieve this 'putting together', teachers from diverse learning areas discuss and plan the teaching together in teams and all, or most, of the specialist teachers are involved, in contributing to the CCH mode lessons as leaders and facilitators as required. The SBS mode allows

teachers to then focus on their disciplinary speciality but since they would all be, or mostly, also involved in the SWM CCH mode courses and projects, they could, over time, develop a deeper understanding of exactly how their subject most effectively contributes to the whole-school, principle objective of education for Sustainable Wellbeing and which aspects of their subject-based content can best be covered and reinforced in the CCH mode lessons. This ideal of complementarity and mutual reinforcement between holistic and specialist epistemological perspectives is far from the current reality of New Zealand's governing education arrangements which I turn to in the following section.

### 2.5.4 The New Zealand Curriculum and National Certificate of Educational Achievement

*NCEA, NZC and the SWM*

Senior secondary schooling in Aotearoa New Zealand circa 2024 remains framed by two main policy instruments, the National Certificate of Educational Achievement (NCEA) and the New Zealand Curriculum (NZC), (NZ Ministry of Education, 2007); the development of which has been majorly influenced by twenty-first-century Future Focused (21CFF) education principles. Although ideally, the democratically determined purpose of education as expressed in a national curriculum should guide teachers in their lesson planning, in reality, the knowledge that is assessed, drives the curriculum (Eyre & Hipkins, 2019; Hipkins et al., 2016). Therefore, and because I have already covered important features of the NZC in several previous sections, I begin this review of New Zealand's official educational framework with the NCEA before briefly discussing the NZC and its major challenge; harmonising its progressive 21CFF front half with its traditional subject oriented back half. The relationship of SWM to the NCEA and NZC is the focus of my second research subquestion; What links can be established between the meta-concept of 'Sustainable Wellbeing', the New Zealand Curriculum learning areas, and NCEA standards or other appropriate school leaver qualifications?

*The NCEA*

The NCEA is a standards-based assessment system typical of the boundary-weakening modularisation trend in 21CFF education described by Young and Muller (2010) in their 'Future-2' scenario. Introduced between 2002 and 2004, the NCEA marked an assessment revolution (Lipson, 2018). Judged by the improved numbers of students staying longer at school and achieving qualifications, NCEA appears to have been highly successful. These numbers "include students who would typically have left school without any qualifications under the previous assessment system" (Hipkins et al., 2016, p. 5). These authors note, however, that "it is not altogether clear whether the increase in qualifications attainment always represents an improvement in the learning of what we might call 'knowledge that matters' or Powerful Knowledge" (p. 5) in the Social Realist—Powerful Knowledge (SRPK) sense. Leaving aside the issue that 'powerful knowledge' is itself a problematic and contested concept (Beck, 2013; Morgan et al., 2019), there is clear statistical evidence of negative trends in Aotearoa New Zealand students' academic achievement and engagement in learning, over the first two decades of the century since the introduction of the NCEA and the NZC.

While the proportion of students gaining NCEA level 2 or 3 rose 43% from around 60% to 86% between 2004 and 2018, over roughly the same period the mean scores for science, reading and mathematics of Aotearoa New Zealand 15-year-olds in the Programme for International Student Assessment (PISA) testing programme declined by 4.2% (2006 to 2018), 4.7% and 7.8% (2000 to 2018). New Zealand's ranking in these subjects amongst the 32 countries of the OECD fell from 6$^{th}$, 3$^{rd}$, and 3$^{rd}$ respectively,

to 6th, 6th, and 19th (Lipson, 2018). Various interpretations for these trends can be speculated such as that in a period of radical curriculum values and objectives reform the definition and assessment of achievement must also naturally change. Nevertheless, it is hard to argue that students will be better prepared for the challenges that face them in the twenty-first century if their core literacy and numeracy skills are declining, particularly as much as they appear to be in mathematics.

Of even greater concern than falling academic achievement are the statistics on school attendance which appear to refute the claims from 21CFF enthusiasts of improved engagement. Attendance figures in Aotearoa New Zealand are low and in long-term decline. "For example, in 2019 just 58% of students attended school at least 90% of the time, compared to 87% of students in England" (Lipson, 2020, p. 44). Again, the educational paradigm transition explanation might be offered for this situation by noting that Aotearoa New Zealand teachers have long been far from united on the relative merits of progressive and traditional approaches to education (Alison, 2008) and that the advance of the 21CFF agenda in the last two decades has exacerbated the divide with an inevitable concomitant impact on student confidence and motivation. Nevertheless, again this situation is far from ideal for the future of education in this country.

Like the SRPK advocates, improved equity of outcomes for all students is an important but elusive goal for the 21CFF proponents of the NCEA and NZC. 'Parity of esteem' for academic and vocationally oriented qualifications across all assessment pathways was a fundamental design principle for the instigators of the NCEA (Hipkins et al., 2016; Johnston, 2016; Lipson, 2018). Parity of esteem however cannot be regulated into existence. The market for skills and qualifications depends on the values of society at large. "Under NCEA, 3 credits at Level 2 can be accumulated for passing standards titled anything from 'Demonstrate understanding of atomic and nuclear physics' to 'Experience day tramps'" (Lipson, 2018, p. 48). Employers and tertiary education providers need to read each student's record of learning detailing how they accumulated their standards and make their candidate selections according to their requirements. The problem is not that NCEA "pretends all subjects – from meat processing to mathematics – are of equal value" (p.9). Rather it is that crediting all knowledge in the form of discrete re-combinable units of assessable knowledge (i.e. 'standards') enables schools, to allow students, to accumulate random assortments of credits without reference to coherence around larger goals of any kind. From a sustainable wellbeing point of view, both career mathematicians and meat processors need the capacities for critical thinking, citizenship, and multicultural awareness; both need to understand the basic maths of global carbon budgets and the climate change implications of livestock farming.

Standards are not units of curriculum but units of assessment. When teachers treat standards as a basis for time-bounded, sequential teaching units the result is curriculum fragmentation and subjects or disciplines become cut up into chunks relating to the standards which are then not typically put together again. The standards become the curriculum. The standards, however, "do not and will never, comprise a comprehensive compilation of all that is worth learning in a subject or discipline" (Hipkins et al., 2016, p. 46). As these authors point out, the potential to develop integrated assessment tasks has been present since the inception of NCEA, but this type of assessment has been largely overlooked, most likely because curriculum integration requires a degree of collaborative planning that cannot simply be added to the full-time job teachers have maintaining their existing independent subject based routines. Valid and reliable assessment for integrated curriculum is also more difficult than established disciplinary assessment both because it is intrinsically of broader scope, potentially cross-curricular and because it is relatively new, underdeveloped and unfamiliar to educators (Boix-Mansilla & Dawes-Duraising, 2007).

According to Lipson (2018) national assessments matter because “they cut through the abstract thinking of vision statements to clarify what is valued” (p. 13). Unfortunately, what becomes valued in effect, simply because it is assessed, is not always what the vision intended. As Biesta (2015, p. 13) observes, if we are merely measuring what we can easily measure rather than what we truly value, we end up valuing what we (can) measure. This is as true of the NCEA as it is of international comparative assessment programmes such as PIRLS, TIMMS and PISA. Assessment has always been an extrinsic motivator for learning in senior secondary school and this effect has only increased under NCEA. The regular internal assessment events of NCEA with their attendant recognition of achievement in the form of credits have meant that the value of the intended learning has quickly become framed almost exclusively in terms of the credits to be gained (Hipkins et al., 2016). This deliberately employed motivational strategy has further exacerbated the fragmentation effect on disciplinary domain-based curriculum. The system also fosters a short-term strategy for learning as students know they need to retain new learning for only a few weeks after which it may be forgotten because the credits have been ‘banked’ (Lipson, 2018, p. 58).

In 2018 the Ministry of Education initiated a major new reform to NCEA in response to increasing pressure regarding longstanding concerns over specific weaknesses such as the system’s fragmentation effect on curriculum, inadequate acknowledgement of mātauranga Māori (Māori knowledge) and perceived insufficient requirements for literacy and numeracy. As an outcome of this review, the NZ government confirmed a package of seven changes to strengthen the NCEA (NZ Ministry of Education, 2023b). Taken together all seven changes seem likely to improve both disciplinary academic rigour and equity of achievement credentialling. The fourth however has the potential to constrain teachers' ability to design and accredit cross-curricular courses which under NCEA became much more feasible than they had previously been (Hipkins et al., 2016). The fourth change proposed is:

> Fewer, larger standards—new achievement standards and resources will be developed to replace existing standards and ensure the qualification achieved credentials the most significant learning in a learning area or subject.
>
> (NZ Ministry of Education, 2023b)

The gains in academic rigour from the most recent changes will be along traditional disciplinary lines and could likely come at the expense of interdisciplinary possibilities integral to a metacurriculum for sustainable wellbeing. Just how restrictive they expect these new fewer larger standards likely to be is one of the questions I put to my research participants

*The New Zealand Curriculum (NZC)*

As mentioned in Section 2.4.7, the NZC is a document of two halves. The influence of the 21CFF turn in education is most evident in the front half which includes eight broad principles namely;

- high expectations
- inclusion
- learning to learn
- community engagement
- Treaty of Waitangi: The curriculum acknowledges the principles of the Treaty of Waitangi and the bicultural foundations of Aotearoa New Zealand. All students have the opportunity to acquire knowledge of te reo Maori me ona tikanga.

- Coherence: The curriculum offers all students a broad education that makes links within and across learning areas, provides for coherent transitions, and opens up pathways to further learning.
- Cultural diversity: The curriculum reflects New Zealand's cultural diversity and values the histories and traditions of all its people.
- Future focus: The curriculum encourages students to look to the future by exploring such significant future-focused issues as sustainability, citizenship, enterprise, and globalisation.

(NZ Ministry of Education, 2007, p. 9)

I have quoted the last four principles in full since they are the principles most likely to enable the emergence of a Sustainable Wellbeing Metacurriculum. The ordering of this list is also pertinent. According to New Zealand's Educational Review Office (ERO), this ordering reflects how evident the principles were in the nation's classrooms in 2011 from most to least (NZ Education Review Office, 2012). "The curriculum principles were more likely to be highly evident in primary schools than secondary" (p. 1). Seven years later the ERO invited 12 secondary schools, selected because they referenced the NZC and its principles in their school documentation, to take part in a study of "the ways these schools provided a coherent curriculum, rather than one dominated by assessment requirements" (NZ Education Review Office, 2018, p. 4). The ERO found that:

> A minority had planned and implemented senior learning programmes that related to the principles, values and competencies outlined in the NZC, and led to coherence in curriculum provision. Others were well on the way to full coherence, with some aspects still to be developed.
>
> (p. 7)

The terms 'Future Focus', 'Sustainability', 'citizenship' and 'Climate Change', appear nowhere in this document although 'wellbeing' is mentioned 20 times. Such was the continuing influence of the BaU configuration over the education attractor in New Zealand secondary schools eight years after schools were legally required to give full effect to the NZC (2007), (Schagen, 2011)

The traditional subject-based curriculum is most evident in the back half of the NZC where curriculum content is broadly specified across eight learning areas and eight age-related levels as Achievement Objectives (AO). The AO are essentially a continuation of traditional curriculum outcomes from the twentieth century. What the NZC does *not* do is show how to weave the high-level aspirations of its front half through the day-to-day stuff of learning outlined in its back half (Hipkins et al., 2016). Considering "the development of NZC as a whole framework there was a clear need for all senior secondary teachers to be supported to think more strategically and critically about the purposes for which they taught their subjects" (p. 26). In so far as NZC embraces curriculum integration through cross-curricular coherence, it does not meet Bernstein's conditions for the success of the integrated curriculum type, most significantly the first condition, "There must be some consensus about the integrating idea if it is to work at all and the idea must be made very explicit" (1975, p. 75).

Target 4.7 of the United Nations SDG 4 states that:

> By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.
>
> (United Nations, 2015, p. 21)

Nevertheless, as Agbedahin and Lotz-Sisitka (2019) observe, "there is an absence of guidance as to how such processes can be engaged, or conceptualized" (p. 104). Similarly based on their international review of Twenty-First Century Education in general, Reimers and Chung (2016) conclude that the difficulty in achieving the goals of a twenty-first-century education "is due to the lack of an explicit and effective systems theory that supports an adequate implementation strategy" (p. 239) and that this represents a critical void in the research literature about how to enable teachers and students to teach and learn in today's world. Similarly, Fadel and Groff (2019) argue that "preparing learners for the unknown world of tomorrow requires going beyond just the 'Four C's'. In short, it requires a fundamental reconceptualization and redesign of the core curriculum" (p. 271). Their 'Four C's' of 21st Century skills are; Communication, Collaboration, Critical Thinking and Creativity.

A key objective of this PhD research is to initiate the ongoing co-construction by Aotearoa New Zealand educators of a conceptual framework based on comprehensive interrelated domains of Sustainable Wellbeing which contributes to filling this theoretical void. The following section shows how a fractal conception of education for Sustainable Wellbeing, is consistent with and extends the suggestions of various curriculum theorists for handling the complexity of wicked problems.

# 2.6 The Theoretical Basis for an SWM Framework

## 2.6.1 Section overview

This section brings together the themes of the previous three sections which have argued that Sustainable Wellbeing must urgently become the central focus of the secondary school curriculum and that this will require a transformative reorientation of education based on complex adaptive systems thinking. Reorienting schooling toward the SWM attractor configuration and away from its current BaU configuration dependence will require persuasive projections for schools of realistic transformational trajectories. A key element of these projections will have to be a comprehensive and coherent framework for a curriculum focused on Sustainable Wellbeing.

## 2.6.2 Toward a complexity model of curriculum

### *2.6.2.1 Intimations of fractality*

As Scott (2012) observes, all graphical representations of sustainable development "are ultimately defeated by the complexity of Sustainable Development (SD) and therefore remain contested", but "the Venn diagram has endured and powerfully influences the way we talk about sustainability and conceptualise its measurement" (p. 46) (see Figure 2-11 below). In Section 2.3.5 I introduced the idea that restricted complexity forms, such as the Sierpinski fractal triangle, could be useful in representing the general complexity of nature. The nested self-similarity property of fractals offers us a new, more

realistic and complexity-oriented way of conceiving the intersectionality of the domains of sustainability and therefore also for the co-construction of a transdisciplinary metacurriculum for Sustainable Wellbeing.

Table 2-1 lists three models that have been proposed for theorising the complexity of interrelated domains relevant to educational systems in the twenty-first century. All three suggest Venn diagram representations for the relationships among the dimensions of their models and their inherent complexity, although Biesta (2015) does not provide a diagrammatic illustration.

*Table 2-1 Multi-Domain models of complexly related educational Domains*

| **Model** | **System/ Context** | **Domains** | **Number of Dimensions/ Domains** | **Author(s)** |
|---|---|---|---|---|
| Framework for a Twenty-First Century Curriculum | 21st Century Learner/ Our VUCA[1] World | Knowledge<br>Character<br>Skills<br>Meta-Learning | 4 | (Fadel & Groff, 2019) |
| Future Focused Issues Curriculum | Humanity/ Planet Earth | Sustainability<br>Globalisation<br>Citizenship<br>Enterprise | 4 | (Bolstad, 2011) |
| Purposes of Education | Children / Education | Qualification<br>Socialization<br>Subjectification | 3 with 8 subordinate aspects | (Biesta, 2015) |

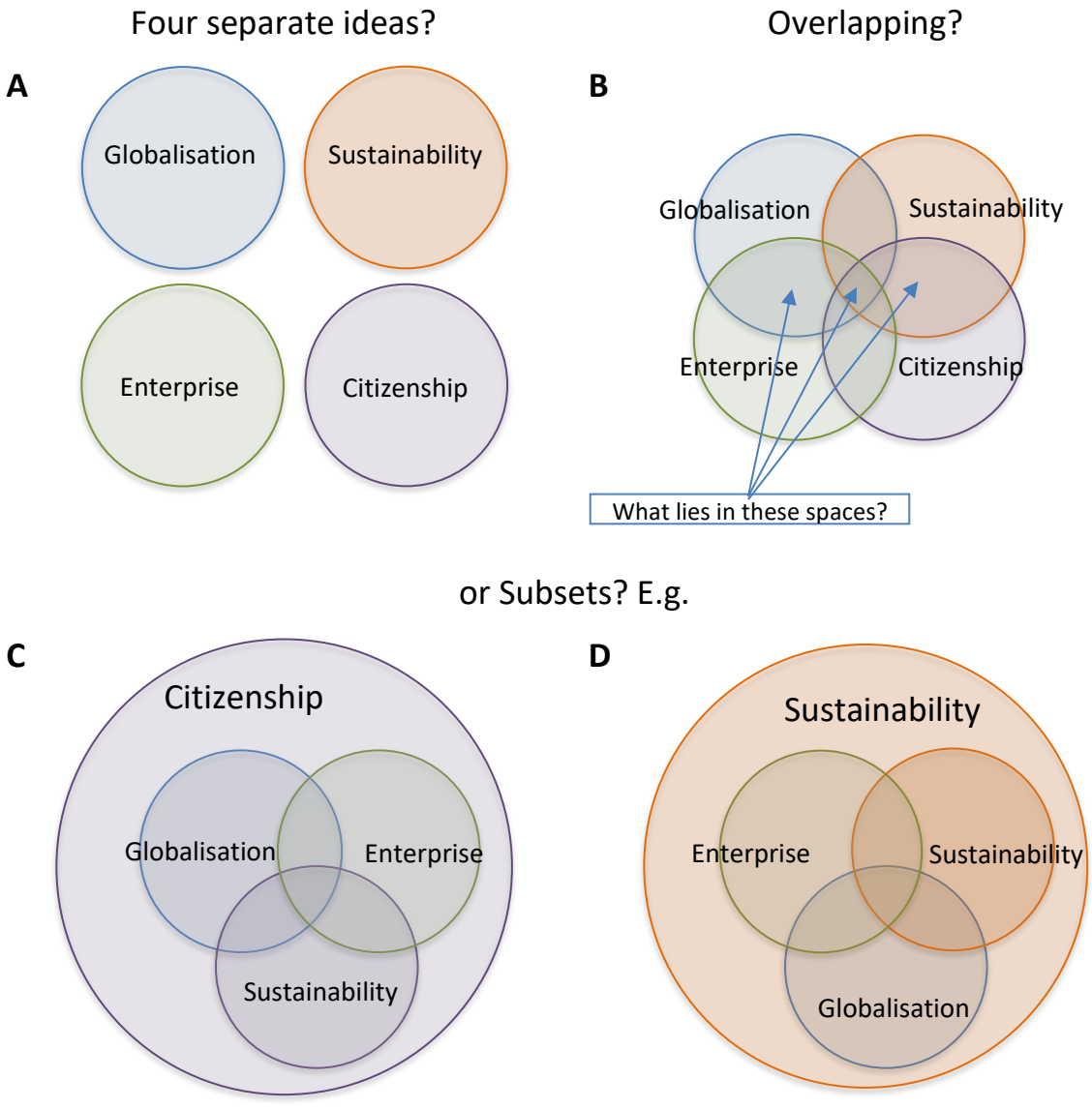
The 'Framework for a Twenty-First Century Curriculum' (Fadel & Groff, 2019) and the 'Future Focused Issues Curriculum' (Bolstad, 2011), both explicitly refer to 'Climate Change' and 'Sustainability' as educational priorities, the former at the level of individual learners and the latter at the level of human/societal issues. The three dimensions of Biesta's (2015) 'Purposes of Education' model span the levels from individual 'Subjectification' to interpersonal 'Socialization' to the global societal purposes of 'Qualification'. The three articles show a progression in terms of suggesting a potential role for fractal subdimensions in representing the complexity of interactions among the dimensions of their models.

Fadel and Groff (2019) refer only to the 'interwoven' nature of these relationships without suggesting how this 'interwovenness' could be represented diagrammatically. Bolstad (2011) questions the adequacy of using the Venn diagram representation for a 'Future Focused Issues Curriculum (FFIC)' model as shown in Figure 2-12. As the author points out, the meanings that people attach to the words sustainability, enterprise, globalisation, or citizenship—the four domains of her FFIC—vary greatly. This raises questions about what meanings people might include within or exclude from each domain of this model and how might their complex interrelationships best be represented and navigated effectively in teaching. "What lies in these spaces?" (p. 12) Bolstad asks, indicating the intersection areas of the Venn diagram in Figure 2-12B. Such representations suggest that there are life situations where each issue is the only issue, or where just two or just three are relevant. In reality, all are present to one degree or another in every situation. The two possible arrangements of the four issues shown

[1] Volatile, Uncertain, Complex, and Ambiguous

in Figure 2-12C and D also raise the question of whether Citizenship or perhaps Sustainability ought to be considered as the primary issue engulfing the other issues as subdomains. Furthermore, the beginnings of a self-similar fractal hierarchy are suggested in both diagrams in that the primary engulfing issue/domain includes itself as a subset. The intimation of fractal self-similarity is even clearer in Biesta's (2015) 'Purposes of Education' model. Before showing how the TSF can be used to illustrate Biesta's (2015) 'Purposes of Education' model, I first describe the generalised multi-leveled, multi-layered TSF and its analogical components.

*Figure 2-12 The Future Focused Issues Curriculum, diagrammatic representation of possible relationships among the four issues (After Bolstad, 2011)*




### *2.6.2.2 The Triadic Sierpinski Fractal form*

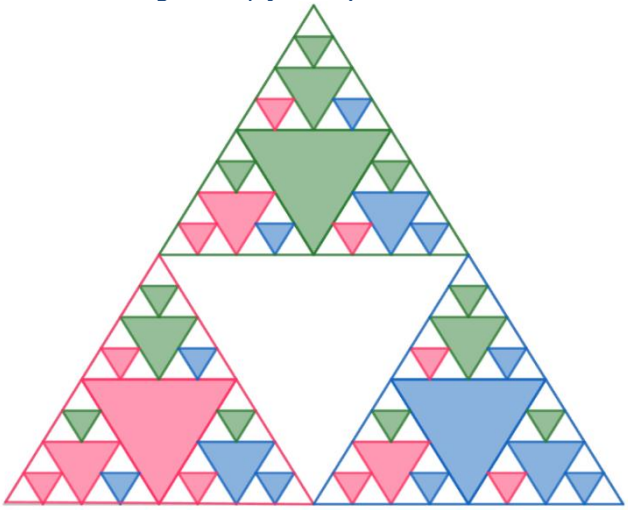
All three of the models listed in Table 2-1, I argue, could be better represented using a Triadic Sierpinski Fractal (TSF) form rather than Venn diagrams. Furthermore, the range of the three models'

scales, from a single individual to Humanity as a whole species can be represented within a single TSF form like the SWM framework.

Figure 2-13 shows just the first four layers of the Triadic Sierpinski Fractal form. The whole form with its central white, apex-down, triangle is a simplified representation of the nested, self-similar structure of a complex adaptive system at a particular level, such as the individual human being, or Humanity as a species. The level is determined by natural boundaries such as those between individual human beings and the social groups to which they belong, those between the individual cells of multicellular organisms and the organ systems they comprise, or those between well-defined species and the genera and ecosystems of which they are part. The white central, apex-down, triangle represents the Attractor of the complex adaptive system which enables the system to self-organise its multiple inner layers and to remain in coordination with the lower layers of the larger System 'above' in which it is embedded. The Attractor is white because its role is not determined and polarised like those of the coloured triangles making up the body of the system. In biological terms, using the somatic, blood and nerve cell types analogy, it can be thought of as an undifferentiated stem cell with the potential to become any of the specialized types. In terms of the human-societal level, the white central triangles represent individual human beings whose specific colouration can change according to the requirements of the social groupings the individual moves through and the relationships they form and dissolve.

The TSF can also be interpreted using the social network diagram representations similar to those shown in Figure 2-6, by imagining the network nodes to be located at the centre of the coloured TSF triangles and—in the case of the Dynamic-Egalitarian network—by creating additional non-hierarchical links.

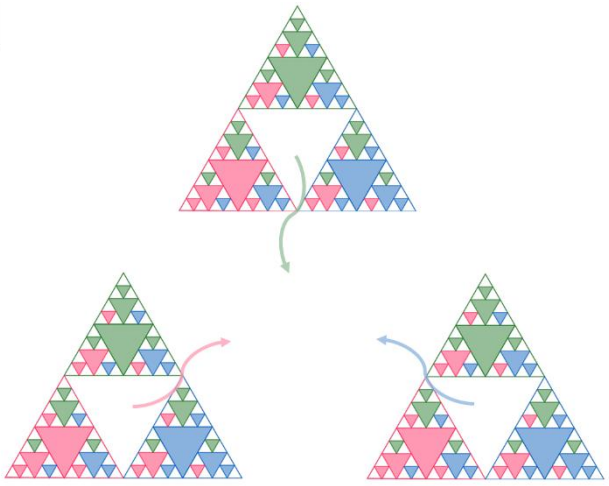
*Figure 2-13 The Triadic Sierpinski Fractal (TSF) form showing the top four layers.*



The word 'Triadic' in 'Triadic Sierpinski Fractal', refers to the distinction between the three vertices or 'poles' of the triangle colour-coded, green, red, and blue, replicated at each layer throughout the structure in a consistent self-similar pattern. Although each pole of the triangle is dominated by one colour, the fractal self-similar pattern ensures that all three domains are present throughout the form

at every layer. The small white, apex-up, triangles in this diagram represent the spiritual potential of the as-yet unoccupied space within the total System of systems. In principle, the range of scales modelled by the TSF can be extended indefinitely by self-similarity, both inward (by replicating the whole form within the small white, apex-up, triangles) and outward (by bringing together three replicas of the whole form around a new central white, apex-down, triangle), as illustrated in Figure 2-14.

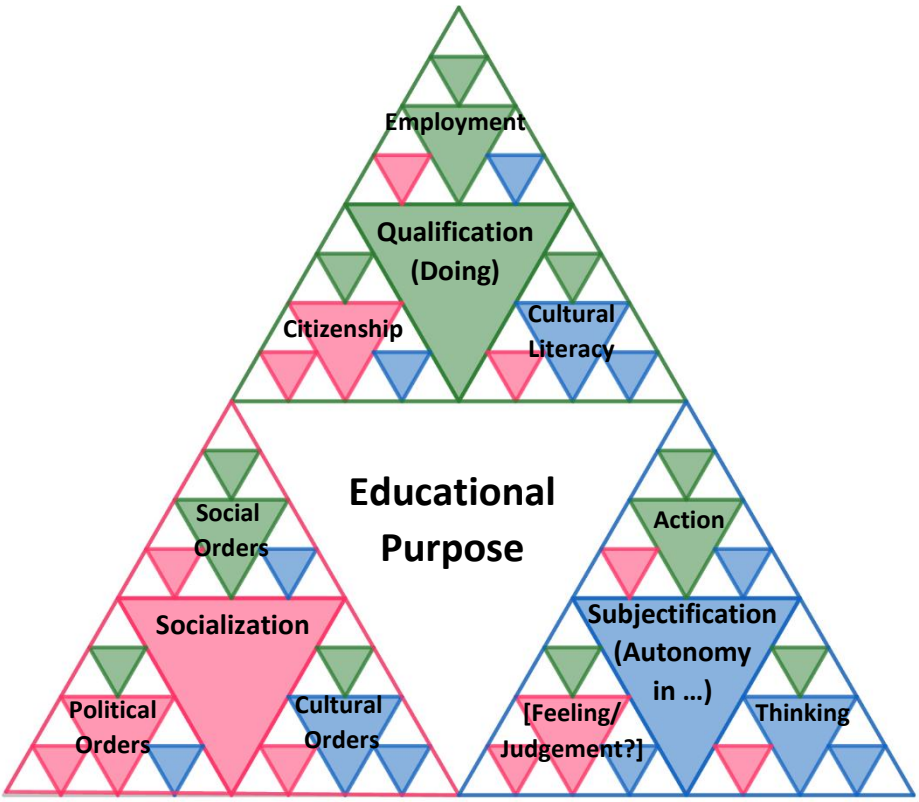
*Figure 2-14 Extending the Triadic Sierpinski Fractal (TSF) Outwardly by bringing together three replicas of the whole form around a new central Attractor (white, apex-down, triangle)*



### *2.6.2.3 A TSF illustration of Biesta's Educational Purposes Model*

In Figure 2-15 I have arranged Biesta's (2015) domains and aspects of educational purpose in a TSF pattern according to the self-similar associations that seem most appropriate to me. Biesta (2015) defines eight aspects of education grouped by his three domains 'Qualification', 'Socialization', and 'Subjectification'. The three aspects of 'Qualification' are employment, citizenship, and cultural literacy which, I suggest, are self-similar to the three domains 'Qualification', 'Socialization', and 'Subjectification' respectively. Biesta (2015) describes the Qualification function of schools as providing students "with the knowledge, skills and understandings—and often also with the dispositions and forms of judgment—that allow them to 'do something'" (p. 20). Employment, then, is the doing aspect of 'Qualification', Citizenship is the Socialization aspect of 'Qualification' and cultural literacy is the Subjectification aspect of 'Qualification'. Self-similar correspondences can likewise be made for the three aspects of 'Socialization'—"The socialization function has to do with the many ways in which, through education, we become part of particular social, cultural and political 'orders'". (p. 20)—and for the two aspects of 'Subjectification'—which "allow those educated to become more autonomous and independent in their thinking and acting" (p. 21).

*Figure 2-15 A TSF representation of Biesta's (2015) Educational Purpose of schema. ['Feeling' under Subjectification is my own addition to the schema]*




Subjectification (autonomy) is coloured blue in Figure 2-15. Autonomy in Thinking is also coloured blue since, in thinking, I argue, we have potentially more freedom than we have in action or feeling. 'Cultural Literacy' in the 'Qualification' domain and 'Cultural Orders' in the 'Socialization' domain are also coloured blue since Cultural narratives—recording histories and imagining futures—can be seen as an extension of the human capacity for thought. The only problematic element in this mapping onto the TSF for me is that Biesta (2015) does not include autonomy of Feeling/judgement as an aspect of Subjectification in his schema. To complete my TSF representation of the schema I have added Feeling/judgement to Figure 2-15 as the suggested omitted 'Socialization' aspect of autonomy.

In the following section, I apply the generalised TSF form to the Sustainable Wellbeing Metacurriculum framework primary domains developed in sections 2.4.3 and 2.4.6 and through this process, illustrate the unified multi-level conception of the framework.

## 2.6.3 A Triadic Sierpinski Fractal Form for an SWM Framework

### *2.6.3.1 Sustainable Wellbeing as the Attractor organising the SWM framework*

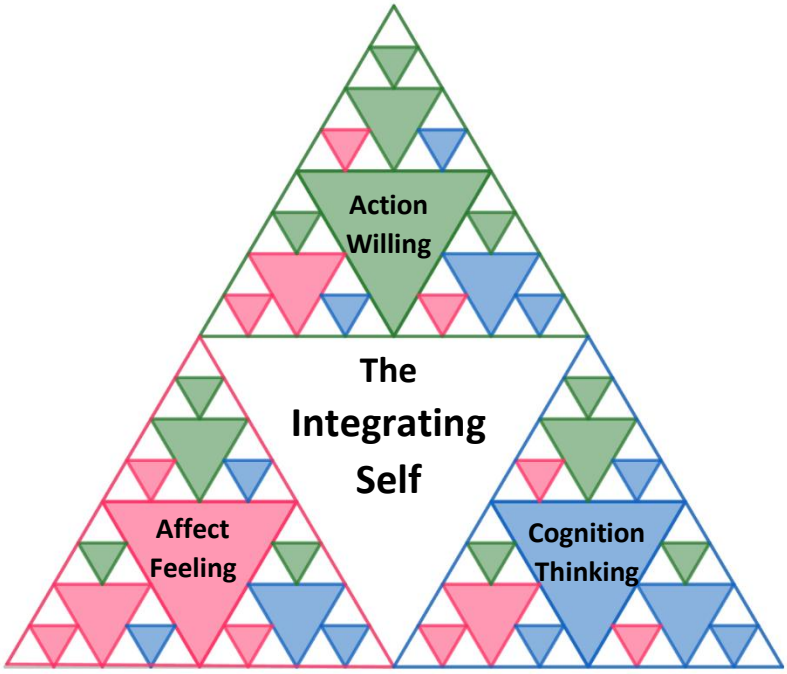
The self-organising attractor In the SWM framework is more closely defined than in Biesta's (2015) 'Purposes of Education' model. 'Educational Purpose' for the SWM is the Sustainable Wellbeing of the Integrating Self and of Humanity, at the Individual-Interpersonal and Human-Societal levels respectively understood as one complex adaptive system within the Earth-Planetary system which is in turn embedded with our Sun-centred Solar System.

The SWM paradigm is posthumanist since it accepts that the currently dominant global perception of humanity's mastery over the natural world is illusory and hubristic (Choat, 2018). At the same time, it is human-centred in that it is our Sustainable Wellbeing as individuals and as a species that is at stake in the Anthropocene poly-crisis we have brought upon ourselves, not the viability of all life on Earth. For a TSF complexivist representation of reality, there is no contradiction here since any part of the TSF is a replication of the whole and the wellbeing of the microcosm and macrocosm are necessarily interconnected albeit hierarchically.

### *2.6.3.2 The SWM framework Individual-Interpersonal level*

Figure 2-16 is a 4-layered TSF version of Figure 2-8 showing the Integrating Self Attractor (layer 1) and its three primary domains of Action, Affect, and Cognition (layer 2), at the Individual-Interpersonal level. Providing names and descriptors for the layer 3 subdomains was a subgoal in answering my first research question.

*Figure 2-16 A Triadic Sierpinski Fractal (TSF) representation of the relationships of head, heart, and hands domains and subdomains of the individual self from the subjective experiential perspective.*




### *2.6.3.3 The SWM framework on the Human-Societal level*

The Complex Adaptive System (CAS) which is homo sapiens as a species—the Human-Societal level of the TSF Model—is shown in Figure 2-17. This diagram, like the Individual-Interpersonal level represented in Figure 2-16, leaves the subdomains unlabelled at this stage. Identifying appropriate descriptors and elaborations of these layer-3- subdomains was also a key subgoal for my first research question.

The nature of the complex processes and mechanisms applying to the structural levels of human social life between the individual and the whole of humankind implied in Figure 2-17, is qualitatively

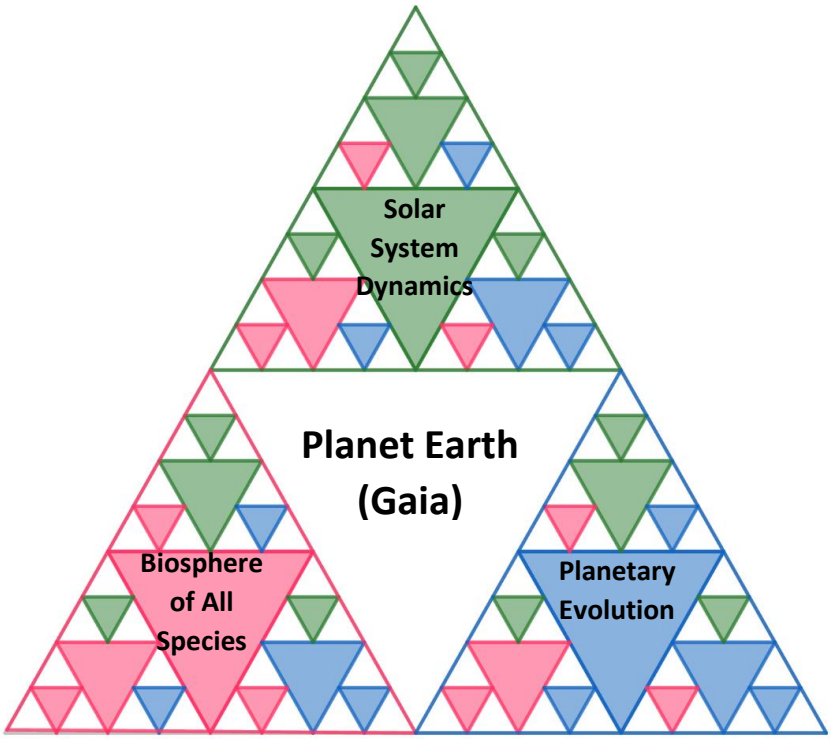
different to that applying to the human organism. Individuals have a degree of autonomy and an agency quite distinct from that of cells. The social structures formed are of diverse and recurring duration. Individuals are continually moving between many groupings of nearest neighbours. Social network theory—as discussed in Section 2.3.5.2—is a compatible but more flexible model for this type of complex structure than the TSF. The value of the TSF model however is that it emphasises the presence of all three base domains—at either the human-societal or individual-personal level—in every social grouping, and educational situation, as they are within every individual. This makes it more useful for the Sustainable Wellbeing Metacurriculum framework as a systematic and comprehensive structure for a holistic view of knowledge.

*Figure 2-17 A TSF representation of the relationships of the Ecosphere, Global Justice and Cultural Vision domains and subdomains of the Human-Societal level of the SWM framework.*


### *2.6.3.4 The SWM framework on the Planetary level*

For completeness, I show in Figure 2-18 a possible TSF representation of the Complex Adaptive System that is Planet Earth (Gaia) and its relationships with its Environment, its Biosphere of life forms, and its Evolution through time. The system that is Humanity shown in Figure 2-17, is also present in Figure 2-18, located somewhere deep in the sub-layers of the domain labelled 'Biosphere of All Species'. Humankind has had a unique part to play in the Planet's evolution culminating in our present Anthropocene which may, in time, be seen as a crucial stage in Gaia's evolution as a self-organising planetary scale consciousness or, if we cannot surmount our self-inflicted Sustainable Wellbeing crisis, as just a momentary flash in the planet's geologic record which our descendants, at least, will never read.

*Figure 2-18 A TSF representation of the Complex Adaptive System that is Planet Earth (Gaia) and its relationships with it Environment, its Biosphere of life forms, and its own Evolution through time.*




### *2.6.3.5 Advantages of a TSF for Sustainable Wellbeing*

The TSF SWM framework has three specific conceptual advantages for educators over prior models and representations of sustainability.

First, the three domains of the SWM framework are based on our familiar human capacities for Action, Feeling and Thinking and framed as the relationships that these capacities permit us with our natural and built environment, with one another, and with ourselves in the sense of our individual self determined life-path.

Second, by being fractal it captures the complex reality that while the three domains of sustainable wellbeing are always distinct, they are also always all present to varying degrees at every level of complex systems from our inner subjective consciousness, to one-on-one interactions, to global systems determined by the local elements in the structure.

Third, as explained in Section 2.6.2.2, the white spaces in the TSF form represent the omnipresence of unpredictable emergence in multi-levelled complex adaptive systems. The central apex-down triangles represent the strange attractors that enable the self-organising of a system yet never themselves materialise, while the apex-up white triangles distributed fractally amongst the coloured domain triangles represent the spiritual potential of the as-yet unoccupied spaces within the total System of systems. This feature of the graphic offers another bridge from Westernised scientific materialism to the concept of wairua in Māori (Rameka, 2015), and to spirituality in other traditions.

#### *2.6.3.6 Limitations of the TSF 'Model'*

While the TSF form is unrestricted in the number of levels and layers within levels that it spans, the SWM framework co-constructed in this study is limited to two levels—the Human-Societal and the Individual-Interpersonal—and in practical application for curriculum planning requires probably no more than four or five layers at each of those levels. During the study, it became clear that the Individual-Interpersonal level data on desirable skills, competencies, and dispositions, needed to be modified to provide for two distinct orientations; Individual-Interpersonal and Individual-Intrapersonal.

The first limitation of the TSF form as a research analogical tool is that by being based solely on triangles it does not capture the level-dependency and inter-layer metamorphosis of general complexity. Even restricted complexity fractal forms are by no means limited to triangular shapes or even to strictly similar shapes at every layer, for example, the Mandelbrot set (Mandelbrot, 1982). This shortcoming could be overcome by adding a compatible scale-free networking interpretation of the social structures lying between the Individual and the Human-Societal species level of the SWM framework, which includes the possibility of non-hierarchical linkages. For the successful introduction of an SWM in a school, I argue, it would be critical to facilitate these dynamic-egalitarian type professional relationships for teachers through modifications to the school timetables that provide for a complementary relationship between CCH and SBS modes of practice, as suggested in Section 2.5.2.

A second limitation of the TSF form is that it appears fixed and static, while the reality of epistemic connections within a holistic view of knowledge, like that of social relationships, is one of constant dynamic flux as individuals move through the various social settings they inhabit in the course of their days, weeks, careers, etc. This caveat has to be made so that the underlying mobility is applied imaginatively to curriculum and course design by users of the SWM framework. Both the scale-free networking and dynamic imagination additions to the TSF form became integral to the SWM framework in its co-construction through the concept of Anchoring and Connected Subdomains described in Section 3.5.4

### 2.6.4 Co-constructing the SWM framework

The initial minimal Sustainable Wellbeing Metacurriculum (SWM) framework arose as a synthesis of the Sustainable Wellbeing domain structure with complex adaptive systems theory and a Cross-Curricular Holistic/Subject-Based Specialist (CCH/SBS) complementarity approach to curriculum. Having established a satisfactory theoretical basis for the SWM framework the next step was to engage the interest of experienced secondary school teachers as research participants in the tasks of elaborating, critiquing, evaluating, and contextualising the SWM project as a whole. The elaboration, critiquing, and evaluation were all aspects of the framework's co-construction. The elaboration specifically was directed at naming and characterising the subdomains of Sustainable Wellbeing in each domain of each level of the framework. The subdomains then needed to be connected with the most appropriate knowledge, epistemes and practices of the eight NZC learning areas; and with appropriate means for assessment—principally NCEA standards—that could accredit student achievement of agency for Sustainable Wellbeing in both the CCH and SBS modes of the metacurriculum. The co-construction phase of this study answered my first two research subquestions. Contextualising the SWM project as a whole then involved answering my third subquestion and the overall question: What would enable secondary schools in Aotearoa New Zealand to establish a Sustainable Wellbeing centred Metacurriculum for their years 11 to 13 students?

## 2.7 Summary

'Sustainable Wellbeing' could be said to describe the principal objective of all creatures who have ever lived. There is an overwhelming accumulation of published evidence that humanity's misapprehension of the necessary conditions for its Sustainable Wellbeing in its exponential ascendency to the position of a globally distributed apex predator has ushered in the Anthropocene epoch, or event (Randall, 2022), with multiple intersecting, self-inflicted, potentially unsurvivable threats to our Sustainable Wellbeing as a species. I have characterised our situation as one of lost connections with our natural, social and cultural environments, and argued that the cultural domain, through educational transformation, will have played a vital role if human beings manage to evolve beyond the Anthropocene.

I have reviewed key insights from Complex Systems theory that I believe can facilitate the necessary educational transformation, including the concepts of Strange Attractors, Fractal self-similarity and the complementary nature of egalitarian-dynamic and hierarchical-dominance scale-free social networks. I have reviewed the various ways in which the concepts of Sustainability, Wellbeing, and Sustainable Wellbeing have been represented in the literature, with particular reference to Education for Sustainability and Wellbeing in the NZC and introduced the two levels of the Sustainable Wellbeing Metacurriculum framework with their three corresponding domains: Ecosphere, Social Justice, and Cultural Vision at the Human-Societal level; and Action, Feeling, and Thinking at the level of the Individual-Interpersonal, Integrating Self.

Educational transformation is essentially socio-political in that it continually revisits the question of "what knowledge is of most worth?" (Spencer, 2009, p. 6). My thesis starts from the premise that knowledge of Sustainable Wellbeing, and how to attain it, is of most worth, but even amongst educators sympathetic to this premise there remains the vexed issue of whether a Cross-Curricular Holistic (CCH) or Subject-Based Specialist (SBS) pedagogical approach is more appropriate in the senior high school years. I have argued from the literature that for an SWM, both are required, providing they can be harmoniously combined to complement the strengths of one another. This a challenge the NZC and NCEA qualifications systems have yet to meet and New Zealand is not alone with this challenge. "The lack of an explicit and effective systems theory that supports an adequate implementation strategy" (Reimers & Chung, 2016, p. 239) for the goals of a twenty-first-century education, which includes future-focused CCH issues like Sustainable Wellbeing, has been identified as "a critical void in the research literature" (p. 239). It is a void that this research project sets out to help fill.

I have set out the theoretical basis for an elaboration of the SWM framework levels and domains introduced in Section 2.4 which uses concepts inspired by complex systems theory, specifically the Triadic Sierpinski Fractal (TSF) model, to generate a starting point for a metacurriculum co-construction research design. This starting point 'Minimal SWM framework', including its approach to investigating CCH-SBS complementarity challenges and facilitating improved opportunities for dynamic-egalitarian teacher interdisciplinary networking is taken up in Section 3.5 within the next chapter which details the methodology for this study.

# Chapter 3 Methodology

## 3.1 Methodology Overview

As argued in Chapter 2, the sustainable wellbeing of life on Earth is a quintessentially complex system phenomenon. Complexity Theory (CT) concepts have played a significant part in the way I framed my research questions and selected my data-gathering and analysis methods. Underlying my main research question—What would enable secondary schools in Aotearoa New Zealand to establish a Sustainable Wellbeing centred Metacurriculum (SWM) for their years 11 to 13 students?—is the complexity theory-based 'SWM Attractor' analogy that pictures the SWM conception as a powerful, emergent, socially transformative attractor configuration—an evolving synthesis of all existing cultures' 'knowledge systems' (Hipkins et al., 2022; Waiti & Hipkins, 2023)—that might function as a viable alternative to the limited, hegemonic Business as Unsustainable (BaU) attractor configuration upon which the Western knowledge system our schools reproduce depends for its continuity. While complexity theory can also provide a profound ontological, and epistemological basis for social scientific research it has been criticised for lacking a socially critical, normative dimension and for restricting itself to merely describing social systems such as education, without providing findings that might contribute to positive social change and outcomes (Cochran-Smith et al., 2014; Kuhn, 2008). To include that socially critical perspective in my research methodology, I take up Cochran-Smith et al's (2014) recommendation to supplement complexity theory with Critical Realism.

Critical realism (CR), originally proposed in the 1970s and developed since by Roy Bhaskar and others (Archer et al., 1998; Bhaskar, 2008b; Danermark et al., 2001), is a meta-theoretical basis for social science research, compatible with the ontology and epistemology of complexity theory and complementary to it in terms of its explicit socially critical and constructive elements. While critical realism provides an appropriate socially critical normative basis for my research, it in turn has also been criticised as overly concerned with hierarchies, structures, and mechanisms and a narrow anthropocentric view of agency.

New Materialism (NM) arose some two decades after critical realism (Bruster, 2003; Choat, 2018), motivated in part by a similar mission to articulate an ontological perspective for research that could unite the natural and social sciences. Considerable dissonances are apparent between new materialism and critical realism that, I argue can be transcended by insights from complexity theory. In Section 3.2, I outline the methodological basis of my research method, emphasising key concepts from Complexity Theory, Critical Realism, and New Materialism, to form a CT-CR-NM synthesis that positions the SWM relative to these three paradigms as a continually emergent, potentially pan-disciplinary framework for education, centred on sustainable wellbeing.

In Section 3.3 I discuss how this CT-CR-NM theoretical orientation translated into a research design to address my research questions and in Section 3.4, I describe how I recruited the twenty-three teachers who so generously offered to participate in this study. So far as my teacher research participants were concerned, the CT-CR-NM theoretical orientation of the study was implicit in my data-gathering instruments and analysis and did not require their attention. However, the SWM framework that I was asking them to co-construct and evaluate had foundational theoretical elements, that I needed to make explicit to them from the outset, in the most accessible and transparent way possible. In Section 3.5 I describe these foundational elements in the form of a minimal SWM framework involving three corresponding domains at each of two levels and explain how I presented this framework in the study's opening Delphi Survey round as a basis for organising participants' suggestions of knowledge,

issues, and big ideas; Skills, competencies, and dispositions they considered important to include in an SWM. I also describe how this minimal framework is related to the underlying fractal form of cross-curricular subdomains that I subsequently used for the analysis of the teacher's suggestions from Delphi round 1, to determine the subdomain titles and the substance of their descriptors and learning goals.

My initial full research design proposed a modified Delphi Survey of three or four rounds, possibly followed by focus groups with teachers and students within one school, providing a school was found during the survey period which was willing to host such a case study. As the project progressed it became clear that an on-site case study was not going to eventuate but the Delphi Survey data would need to be supplemented through semi-structured interviews with participants. The eventual research design that emerged including the analytical techniques I used is detailed in Section 3.6. In a social research project where the researcher is evaluating a proposal that they are personally invested in and where the participants are self-selected based on their interest in that proposal, issues of the trustworthiness of the data analysis and interpretation, as well as the usual ethical considerations around the researcher's duty of care to their participants, must be carefully considered. In sections 3.7 and 3.8 I discuss how I managed these issues.

## 3.2 Onto, Epistemo and Axio-logies

### 3.2.1 Section Overview

This research project adopts complex adaptive systems theory—introduced in Section 2.3—as a fundamental ontological and epistemological perspective. I use the phrase 'complex systems theory' here to include both natural scientific complex dynamical systems theory with its mathematical representations and the social sciences' analogical and metaphorical adoption of the language of scientific complexity theory for describing and understanding social phenomena. To reiterate, the concept of strange attractors underlies the 'SWM Attractor' analogy that imagines the SWM configuration of the attractor functioning as a viable alternative to the BaU configuration that currently dominates education in New Zealand. The SWM framework TSF concept is based on the fractal self-similarity principle. Complex social network theory also informs the investigation of teachers' professional relationship structures and how the cross-curricular SWM framework might be applied by teaching teams and individual subject-based teachers collaborating in the design and practice of their local curricula with students.

The roots of complex systems theory are in the natural sciences but complex systems theory has significant epistemological and methodological deficiencies for the social sciences and education research. There have been three main critiques: first, that complexity theory has difficulty moving beyond post hoc description; second, that the role of causation is problematic in complexity theory; and third, that it does not address the issue of values and morality which are intrinsic to the normative business of education (Cochran-Smith et al., 2014; Kuhn, 2008; Morrison, 2008), i.e. it lacks an explicit axiology.

Cochran-Smith et al. (2014) suggest that integrating complexity theory as a scientific ontology with Roy Bhaskar's (2008a) critical realism, a synthesis they label CT-CR, offers a means of addressing these epistemological and methodological issues. Other authors (Byrne & Callaghan, 2022) refer to this synthesis as 'complex realism' or simply 'complexity theory' and trace its origins back to the early 1990s. In Section 3.3.1 I present a response to the 'post hoc description' critique of Complexity theory by describing methodological approaches that may be characterised as the "pragmatics of transformation"(Davis & Sumara, 2006, p. 130). In Section 3.3.2 I present a clarification of how the

'problem' of causation may be resolved for Complexity theory. Both responses relate to elements of critical realism such as the 'Transformational Model of Social Activity' (Archer, 2020; Archer et al., 1998; Bhaskar, 2014) and its three ontological domains: the real, actual and empirical.

Critical realism shows also how complexity theory can be extended to address the values, ethics, and power characteristics of social systems such as education in ways that effectively respond to Morrison's (2008) critique that complexity theory is inadequate (or, at best, incomplete) as a theory of education and that it "under-theorises power" (2008, p. 28). Critical realism addresses this omission in ways that have been described as reinforcing and extending the core principles of Marxist Historical Materialism (Ehrbar, 2007; Westra, 2019). While critical realism offers a satisfying resolution to the philosophical tension between naïve positivist realism and post-modern relativism, like Marxism, it retains a human-centred orientation toward nature and the material cosmos as regards agency and subjectivity and a focus on transforming existing social structures and systems.

The SWM is also centred on humanity but through its three key domains of relationship, it aims to address and heal humanity's ailing relationships with nature, its social structures, and with itself, i.e. how we see our evolution and destiny as a species. To that end, a posthumanist, partnership attitude toward the more-than-human and its capacity for agency, with potentially existential consequences for us, seems more survivably appropriate. The creation and exploration of novel egalitarian rhizomatic social networks and new interdisciplinary relational possibilities, in addition to the transformation of existing institutions, will also be needed. For this reason, I include New Materialism (NM) for its posthumanist, wider view of agency and emphasis on spontaneous events and assemblages to complement critical realism's structures and hierarchies, as my third philosophical point of reference completing a CT-CR-NM methodological synthesis.

## 3.2.2 Complex Systems Theory, Critical Realism and New Materialism

### *3.2.2.1 Critical Realism*

*Resolving the philosophical dichotomy*

Critical realism resolves the philosophical dichotomy between naïve positivist-realist absolutism and post-modern idealist-interpretive relativism through its fundamental premise that "there exists both an external world independent of human consciousness and at the same time, a dimension that includes our socially determined knowledge about reality" (Danermark et al., 2001, p. 5). While our knowledge of reality is always fallible, there nevertheless exist methodological and theoretical tools that can help us discriminate among theories according to their capacity to inform us about external reality (Danermark et al., 2001). For Bhaskar(2013), this discrimination included a normative dimension and as such aligns with this project's centring on Sustainable Wellbeing as the primary criterion of educational purpose. Critical realism is concerned with human emancipation, particularly from the depredations of unregulated capitalism and human separation from nature.

> The world that men have made and which we currently inhabit is a world of duality: of unhappiness, oppression and strife—more especially, it is a world in which we are alienated from ourselves, each other, the activities in which we engage and the natural world we inhabit, currently hurtling into crisis and self-destruction.
>
> (Bhaskar, 2013, p. 8)

Critical realism characterises the world as structured, stratified, differentiated and changing (Danermark et al., 2001). The structured nature of reality is compatible with the idea in Complexity

theory of nested levels of organisation in nature, complex systems within complex systems, from atoms and molecules, through cells, organisms, and species, social networks and hierarchies to planetary systems and beyond. Critical realism's stratified nature of reality described in its seven-scalar laminated system (Bhaskar et al., 2010)—emphasises the subjective levels of human consciousness and social structures but links up at the planetary level with complexity theory's objective fractal and nested levels of organisation. The emphasis on change in critical realism accords with the conception of complex adaptive systems as being always far from equilibrium as they continually probe, adapt, learn, and maintain their boundaries in dynamic relationship with one another and their environment.

The SWM framework models the structured, stratified, differentiated nature of reality through its fractal self-similarity form of three mutually interpenetrating domains. Through its (initially) two levels—the Individual Interpersonal, and the Human-Societal, which could if required be extended inward and outward to the microcosm and macrocosm—it incorporates both the inner subjectified strata of critical realism and outer objectified strata of complexity theory.

*The empirical, the actual and the real*

Critical realism provides an ontological map that differentiates three domains of reality; the empirical, the actual, and the real. That which we experience, directly or indirectly, constitutes the *empirical* domain (Danermark et al., 2001), or "All we can observe" (Granados-Sánchez, 2023). The empirical domain is separated from the *actual* domain of events that occur whether we experience them or not (Danermark et al., 2001). The Actual Is the effects of the Real producing changes we can grasp, whether we do or not, i.e. "All we can grasp" (Granados-Sánchez, 2023). "The Actual is in turn separated from the *Real*. In [the Real] domain, there is also that which can produce events in the world, that which metaphorically can be called mechanisms" (Danermark et al., 2001, p. 20). The Real includes all that exists. It is independent of us and whatever we think we know about it (Granados-Sánchez, 2023).

In my view, 'mechanisms' is an inappropriate word choice to describe what is better characterised in Taoism as the eternal interplay of the receptive Yin and creative Yang forces of reality (R. Wilhelm & Baynes, 1967). The real can be discovered or *seen* in moments of insight and enlightenment yet it is inexhaustible in its capacity for novelty and renewal. If the Real includes all that exists, it includes the Actual and the Empirical as subsets. Similarly, the Empirical is a subset of the Actual. The separation of these domains is definitional and fluid, not fixed. They exist on a continuum and their boundaries are fluid. This interpretation of critical realism recognises the known and the mysterious—the unknown and the unknowable—as being inextricably aspects of the human condition. We may not "grasp" some aspect of the Real—either theoretically or emotionally—yet still influence events at that level through our decisions and actions. In an irreducible universe, there can be no final Grand Unified Theory of everything. In this way, critical realism is compatible with holistic, and indigenous worldviews.

In terms of Sustainable Wellbeing, we could say it is the real that determines the conditions that make possible the continuing evolution of organic lifeforms on this planet. The real determines the biospheric limits governing how human beings affect the planet's global climatic states, and the ultimate fate of the solar system to which it belongs, not our theories about it, however accurate they may prove. But it is also in the real that our potential for awareness, theorising, thinking, feeling, agency and social organisation originates. This ontological position is intrinsic to the SWM framework. The framework itself, however, is directed toward the actual. It attempts to be a comprehensive,

coherent and open synthesis of all phenomena human beings have made sense of and are yet to understand in our unending effort to attain and maintain the state of balance that is our sustainable wellbeing. The construction process that this study adopts as its research design and the data collected properly belong to critical realism's empirical domain since they are the experiences of my research participants as observed, interpreted and represented from my perspective as the researcher.

*Intransitive and transitive*

According to critical realism, both natural and social sciences have their intransitive and transitive dimensions (Danermark et al., 2001, p. 22). The *intransitive* objects of science belong to the real domain of underlying mechanisms that exist independently of our knowledge of them. The sciences themselves consist of theories about this independent domain. These theories are the raw products of science that constitute its *transitive* domain. Critical realism sees the complex relationships of social structures as the intransitive objects of social science in the same way that physical phenomena are the intransitive objects of natural science. Critical realism further maintains and explains how those structures are related to the agency of individuals and to intersubjectively negotiated conceptions of reality which are intrinsically about the values, power, and ethics that any complete account of a social system must include.

> The social structures, that are reproduced or transformed when members of society act in accordance with their concepts of reality, are real. They contain powers and mechanisms which operate independently of the intentions of the actions here and now. In this capacity, they constitute at every moment the intransitive object of social science, which scientific conceptualization, that is the transitive object of social science, is all about. (Danermark et al., 2001, p. 35)

The intransitive objects of my study are the experiences, judgements, and views on education for sustainability and wellbeing of my teacher participants. The SWM framework, as it is emerging, and my characterization of the SWM as a potential alternative and transformative system attractor configuration for education, are its transitive objects.

*The Transformational Model of Social Activity (linking structure and agency)*

The crucial distinction between Complexity Theory in the Natural Sciences and Complexity Thinking in the Social Sciences may be the assumption—made in the latter but not the former—that Agency is inherent in Complex Adaptive Systems (Byrne & Callaghan, 2022, p. 14). The Organisation for Economic Co-operation and Development (OECD) (2019, p. 16) defines 'Agency' as a person's ability to "… positively influence their own lives and the world around them as well as the capacity to set a goal, reflect and act responsibly to effect change." The Transformational Model of Social Activity (TMSA) (Archer, 2020; Archer et al., 1998; Bhaskar, 2014), is a key critical realist concept linking structure and agency. The TMSA views the relationship between individual action (Agency) and Society (structure) as transformational rather than dialectical. The two, like Yin and Yang, are mutually constitutive. Societies are a material condition and outcome of individual action while Agency transforms or reproduces society (Granados-Sánchez, 2023).

The TMSA presents social structure as pre-existing individual agents but as emergent from the collective interactions of its agents and thus only relatively enduring, in contrast to the intransitive

dimension of natural science. Social structures are real and powerful but not deterministic of an individual's possibilities. Individuals have the agency to reproduce or transform the structures they are born into and live within throughout life. People working together and generating new ideas are a powerful force for structural transformation (Granados-Sánchez, 2023). Ultimately, belief in this insight underpins the motivation for this study toward a Sustainable Wellbeing Metacurriculum and it was the basis for including questions about schools' structured team teaching arrangements in my Delphi survey and semi-structured interviews.

While Complexity Theory under-theorises power, Critical Realism, according to New Materialism, under-theorises agency and subjectivity. The New Materialist paradigm has much in common with a union of Complexity Theory and Critical Realism and can usefully supplement that ontological foundation for an SWM through its posthumanist perspective and wider, more enlivened concept of agency. There are also, however, some problematic elements in New Materialism for the SWM. The following section discusses how New Materialism contributes to the CT-CR-NM philosophical basis of the SWM framework, including those elements expressly excluded.

#### *3.2.2.2 New Materialism*

*The main defining features of the 'New Materialism'*

The main defining features of the 'New Materialism' include a re-engagement of the social sciences and humanities with natural science under the banner of 'posthumanism' as an ethical response to realities like the risk of catastrophic ecological collapse; a 'flat ontology' which asserts that while "entities may differ in terms of their capacity to produce effects, no entity is any more real than any other" (Choat, 2018, p. 1031); and a redefinition of Agency to include matter as lively or as exhibiting agency. The materiality addressed … "for some new materialist scholars is invested with a vitality or liveliness, as opposed to being inert and passive matter" (Fox & Alldred, 2018, p. 2). 'Entities' in this sense refers to material bodies and their relationships—human, non-human, animate, or inanimate—not to the cultural interpretations, models, concepts and discourses attempting to represent 'the real', or 'imagined realities' (Harari, 2011) such as 'the government', 'the economy', or 'the Apple corporation', that affect human behaviour but exist only through human cultural consensus. There is, therefore, no conflict here between the flat ontology of new materialism and critical realism's concepts of the real, actual, and empirical domains, or the transitive and intransitive objects of the natural and social sciences.

*New Materialism, Flat Agency Absurdity & avoidance of intention*

New materialism's 'flat ontology' is consistent with the CT-CR rejection of reductionism, in that no complex adaptive system can be explained by reducing it to some other primary reality (Byrne & Callaghan, 2022; Choat, 2018). All three perspectives concur about the irreducibly complex nature of reality. However, the new materialist conception of 'Matter's Agency' (Barad, 2007) may initially seem absurd to a Critical Realist. 'Agency' is commonly associated with this notion of deliberate conscious intentionality or direct action. The New Materialists sidestep this difficulty by redefining agency with alternative conceptions that avoid intentionality (Choat, 2018). For example, Fox and Alldred (2018, quoting Deleuze and Guattari, 1988: pp 127-128), define agency simply as a "capacity to affect and be affected".

*Posthumanism and the Agency of Matter*

A consistent ethic of equity that is two-fold in its implications, appears to motivate new materialism's 'agency of matter' and 'flat-ontology' conceptions. First, there is New Materialism's posthumanist concern with human hubris and our illusion of mastery over the natural world (Choat, 2018). Second, there is the new materialists' critique of Critical Realism's focus on the purposeful transformation of social objects—systems, structures, hierarchies, and mechanisms—preferring a more fluid complex, dynamic, and open ontology founded on difference, heterogeneity, assemblages that develop around events, along rhizomatic pathways of relationship and emergence (Fox & Alldred, 2018). In this respect, New Materialism seems more concerned with the Dynamic-Egalitarian variety of complex social networks and Critical Realism is more with Hierarchical-Dominance networks. The notion of 'enabling constraints' from complexity theory (Davis & Sumara, 2006), introduced in Section 2.3.4.3 provides an insight into why hierarchies, structures, systems and mechanisms can, and in fact must, coexist with assemblages, differences, heterogeneity, and emergence—in a complex living universe. The former constrain while the latter enable complex systems to maintain their integrity in the face of disruptive environmental forces, while also remaining open to adaptive changes.

New Materialist theorists are strongly associated with posthumanism and post-anthropocentrism which critique "the pervasive post-Enlightenment outlook that has considered humans (and more typically, white male Western humans) as the centre of concern, and the 'measure of all things'" (Fox & Alldred, 2018, p. 8).

> De-privileging human agency also serves as an ethical and political counter to the humanism of the social sciences, supplying the basis both for an antihumanist critique of the environmentally destructive capacities of humans, but also to re-integrate humans within 'the environment'.
>
> (p. 5)

These are positions that are entirely consistent with the values underpinning the SWM and its relational conception of the interpenetrating Ecosphere, Social Justice, and Cultural Vision domains. New Materialism's 'flat-ontology' is consistent with the posthumanist equality of all material things. They are, after all, equally impermanent, the instinct for self-preservation and Sustainable Wellbeing notwithstanding.

*Marxism, Flat Ontology, Agency and irresponsibility*

However, while the new materialists' posthumanism advocates human ecosophical humility, its 'flat ontology'—which acknowledges that entities differ in their power to produce effects—has also been used to minimise human responsibility for the misguided agency of more powerful entities. Choat (2018) cites a New Materialist argument (Bennett, 2010), advanced to explain that no one could reasonably be held responsible for the North American power blackout that occurred in August 2003. So many agents were involved in this assemblage of consumers, energy companies and regulators, buildings, computers, coal, electrons, etc. the argument went, that the blackout could not be blamed on rapacious corporations, lax regulators or industry deregulation and privatisation. Through their flat ontology, some new materialists appear to be holding human artefacts responsible for their effects on us, in a way that obliterates the essential distinction for complexity theory and the SWM, between complex living systems and the merely complicated machines and objects we create, as if we are not capable of totally controlling whether they are even produced in the first place.

By contrast, Critical realism's human-centric interpretation of agency is consistent with the historical materialism of Marx (Ehrbar, 2007; Westra, 2019). Both place the responsibility for the consequences of human agency and societal transformation on humanity itself. What interests Marxists and I suggest Critical Realists also, is "not the generic materiality of all objects but the *material conditions* under which objects are produced or used" (Choat, 2018, p. 1034) and, I would add, the *material consequences* of that production and consumption. For the SWM, ultimately what matters most is applying our individual and collective agency to achieving the sustainable wellbeing of human relationships in all their Ecospheric, Social and Cultural complexity.

*The 'Integrating Self', Agency, and Subjectivity*

The 'Integrating Self' is a key concept for the Individual-Interpersonal level of the SWM minimal framework domain structure (Section 3.5). What exactly the phrase might mean for secondary school teachers and how they support its development in their students was an essential question explored in the first round of my Delphi Survey. My intention in using the phrase 'Integrating Self' was to evoke all the conscious and unconscious intentional processes that sustain an individual's wellbeing which might be conceived of as a self-organising, complex system attractor. In combination with the domains of Action, Feeling, and Thinking—Agency, Affect and Cognition—the idea of an 'Integrating Self' has significant intersections with the concepts of Taha Wairua–spiritual wellbeing– in the mātauranga Māori model of Hauora (Wellbeing), Te Whare Tapa Wha (Durie, 2009) and with Tao (the Way, of heaven, earth and humankind) in The I Ching, the Book of Changes (R. Wilhelm & Baynes, 1967) and Castaneda's (1991) 'bands of awareness'.

The CT-CR-NM conception of agency and intent provides a potential philosophical point of departure for exploring and developing the concept of the 'Integrating Self', particularly the new materialist posthumanist perspective which addresses the meaning of subjectivity and the self as a biographical continuum. If agency can be a universal characteristic of complex beings and collectives according to kind, then why not also the potential for awareness and subjectivity? The meaning of the phrase 'Integrating Self', like 'Sustainable Wellbeing', in the spirit of the SWM must remain undefined. Its educative value lies in its capacity to inspire discussion and imagination.

### 3.2.3 The SWM CT-CR-NM Synthesis and 'SWM Attractor' Analogy

In Section 3.2, I have presented the methodological basis of my study as a particular onto, epistemo, axio, logical synthesis of complexity theory, critical realism, and new materialism. This synthesis locates the way I approached data gathering and analysis—relative to these three philosophical paradigms—in setting out to discover what a teacher-co-constructed SWM framework might look like and then to illuminate the main factors that may be constraining or enabling its adoption in New Zealand secondary schools.

The concept of strange attractors from complexity theory—as elaborated in Section 2.3.4.2—is fundamental to the 'SWM Attractor' analogy underlying my main research question. It suggests that the Sustainable Wellbeing Metacurriculum might function as an alternative emergent, socially transformative attractor configuration capable of replacing the Business as Unsustainable (BaU) configuration of education that still dominates Westernised schooling.

For there to be any meaningful self-organisation enabling the emergence of a coherent ‘self’ or social collective with agency, something must function as an attractor. Although individuals may play pivotal roles at key moments in a complex social system, the "something" forming the attractor, “the ‘object’ at the centre, is never an individual but an idea, a shared commitment, a common purpose, a collective orientation, an emergent possibility” (Davis & Sumara, 2006, p. 145). A sufficiently urgent, inspiring, and convincing idea has the power to focus and coordinate the agency of individuals into a transformational step change from one form of self-organising social structure to another more adaptive form.

To strengthen the potential of "an overarching morally imbued vision" to act as a transformative attractor for education, Gilead and Dishon (2022, p. 831) recommend keeping the vision fluid and publicly debated. They suggest we present the vision as a ‘broad orientation’, not as a fixed point, and not to abandon normative goals. Beyond the Vision itself lies the question of which issues are most important to address, and how. These recommendations accord with my choice of a Delphi Survey as the opening instrument in my research design and informed the wording of the survey questions. The first goal of the survey was to discover if a unifying vision of what ‘Sustainable Wellbeing’ is, would emerge from this group of teachers' interpretations of the phrase and the second was to facilitate their expression and development of that vision through the issues they raised and suggestions they made, both for priority curriculum content and concerning factors that might enable or constrain the implementation of that curriculum.

In the following section, I discuss how my SWM CT-CR-NM philosophical synthesis and the ‘SWM Attractor’ analogy underlying my research questions influenced my research design.

## 3.3 The Research Questions and Methods

### 3.3.1 Addressing the research questions from a CT-CR-NM theoretical perspective

Cochran-Smith et al. (2014) describe three ways in which researchers have utilized Complexity Theory to shape their inquiries. In brief, they could be labelled: (a) Re-conceptualizing theoretical, (b) empirical interpretive case specific, and (c) empirical transformative. Davis and Sumara (2006) use the term “pragmatics of transformation” (p.74) for studies of type (c) and describe them as the third stage of the evolution of Complexity Science.

My research for this PhD project employed (a) and (b) but not (c) as my communications with my teacher participants were all conducted one-to-one through emails, online survey forms and remote semi-structured interviews via Zoom. Apart from having emissions minimisation, time and cost-effectiveness advantages, the remote interviews were also a public health adaptation at the time since the data collection stage of this study was taking place during the height of the COVID-19 pandemic in 2021-22. My participants were all located in separate schools with no opportunity for interactions among themselves other than indirectly through the written reports I provided for them following the second and third of the three Delphi survey rounds and their responses in subsequent rounds of the Survey or the interviews. Although this project did not directly involve a Complexity 3.0 element, it was conceived of as a necessary first step toward a future on-campus case study facilitating the implementation of an SWM in a yet-to-be-identified pioneering secondary school.

My first two research sub-questions:

1. What would/could a framework for an SWM co-constructed with teachers look like? and
2. What links would/could teachers establish between the SWM framework, the New Zealand Curriculum learning areas, and National Certificate of Educational Achievement (NCEA) standards or other appropriate school leaver qualifications?

… can be categorised as Re-conceptualizing theoretical, while the main question:

> What would enable secondary schools in Aotearoa New Zealand to establish a Sustainable Wellbeing centred Metacurriculum (SWM) for their years 11 to 13 students?

and the third sub-question:

3. How can the uptake and development of the co-constructed SWM framework for years 11 to 13 students amongst Aotearoa New Zealand secondary schools best be enabled?

Were answered from an empirical interpretive case(s)-specific point of view.

The ultimate goal of this research was to describe the main defining characteristics of a new optimal self-organising and self-sustaining attractor configuration for Sustainable Wellbeing education in Aotearoa New Zealand secondary schools along with potential trajectories toward and within that configuration.

### 3.3.2 Cause-Effect versus Complex Emergence Research

Seeking radically new forms of education requires radically new ways of doing educational research (Gilbert, 2019). Much traditional educational research uses methods like Hierarchical Linear Modelling, for example (Hattie, 2003), or meta-analyses of many such statistical multi-variate studies, for example (Hattie & Donoghue, 2016), where the focus of interest is on identifying the most effective strategies for learning and student achievement with a best practice ideally cause-effect conclusion in view. The traditional approaches to educational research frame their systems of interest as Simple, where we are dealing with known knowns, or possibly Complicated involving known unknowns, rather than Complex. Complex System methods become appropriate when we are faced with 'unknown unknowns', situations in which "Nothing is predictable or repeatable: [and] we can't separate cause from effect in advance (although it may be possible after the event)" (Gilbert, 2015, p. 11). Research in Complex Systems is a matter of participation and understanding the present moment and context. The strategies and solutions arising from Complexity research are termed 'Emergent'. Snowden (2002; 2007) advocates using multiple, small-scale 'safe-to-fail' probes to test a complex system's responses, which can then be amplified or damped down, not to control the system for well-specified narrow outcomes but rather to 'steer' it in a general direction.

### 3.3.3 Research Approach

Byrne and Callaghan describe the acceptability of combining quantity and quality data in a unified approach to the understanding of and action in systems as "one of the great promises of complexity

as a frame of reference" (2022, p. 29). The system of interest implied by my research questions includes three levels of the education sector in Aotearoa New Zealand; individual teachers, the schools within which they are working, and the nationwide population of all New Zealand schools with enrolled 16 to 18-year-old (year 11 to 13) students. The data I utilised for the New Zealand schools level were comprised of demographic and student achievement statistics accessed through the New Zealand Ministry of Education's (MoE) website[2]. The data for the individual schools' and teachers' levels were provided by my teacher research participants and the research approach at these levels was necessarily participatory. Byrne and Callaghan note that the possible approaches to participatory research vary in terms of their degree of co-researcher involvement in research design and analysis but all reject the positivist "notion of research 'subject' and the distancing of researcher from researched" (2022, p. 124).

My research approach was participatory from the outset but kept open to adaptation in light of participants' responses to each round of the inquiry. The statistical analysis of the participants' schools' demographics began after the first survey round and the interviews were sought after the second survey round when it became apparent that the teachers had bigger and more nuanced stories to tell about their personal and their school's relationship with Sustainable Wellbeing than could be anticipated by a uniform set of survey questions. In terms of recognised research paradigms, this study was a mix of three that Torbert (2021) describes as 'Empirical Positivism', 'Multi-Method Eclecticism', and 'Cooperative Ecological Inquiry'.

### 3.3.4 Self-Selected Samples and Population Statistics

Torbert (2021) describes Cooperative Ecological Inquiry as: "Commitment to creating real-time communities of inquiry (i.e. communities that bridge subjectivities and differences of perspective, that confront incongruities among vision, strategy, action, and outcomes, and that support voluntary, mutual personal and social transformation) (2021, p. 3)". Communities of inquiry for research require individuals whose participation in the research is an expression of their informed agency. Informed agency implies that the participant group is either systematically or self-selected rather than randomly selected as is the ideal in the 'Empirical Positivist' paradigm, where statistically valid comparisons between a treatment group and a control group are sought. In my demographic statistical analysis of all schools nationwide, the self-selection of the schools—by my panellist teachers' self-selection—was, in effect, the treatment and the remaining general population of schools, served as the control group.

Self-selection, however, also comes with the risk of selection bias associated with the specifics of a study's participant recruitment strategy which can undermine the intention to bridge subjectivities and differences of perspective. The nature of possible selection bias and its potential effect on how well this study's participant group represents the diversity of New Zealand secondary school teachers and schools is examined where appropriate in the following Findings chapters and the Discussion Chapter 7. The value of the statistical demographic analysis undertaken for the entire population of relevant New Zealand Secondary schools was that it provided some independent evaluation of both the nature and degree of bias arising from the study's self-selection sampling strategy and hence also its transferability/external validity. The following section recounts how the participant recruitment strategy unfolded.

[2] https://www.educationcounts.govt.nz/directories/list-of-nz-schools

## 3.4 Participant Recruitment

The participant recruitment stage of this study began in early March 2021. The basis for the participating teachers' self-selection and informed agency was the text of my study recruitment emails and Facebook website posts. The key section in the invitation seeking to engage teachers' interest in this study—effectively the initial basis of their self-selection and informed agency—was the following text:

> My project is based on two premises:
>
> - that within the next 10 to 20 years humanity must radically transition from a world of nations founded on environmentally, socially, and culturally exploitative GDP growth to a global civilization prioritizing sustainable wellbeing; and
> - that education at all levels and for all people has an integral and vital role to play in this transition.
>
> The research will explore what would enable New Zealand secondary schools to establish a curriculum centred on Sustainable Wellbeing for their students and locality. It will focus particularly on the development of a curriculum framework for students in years 11 to 13, linked to related collections of NCEA standards, or other appropriate school leaver qualifications, for all disciplines, and all career paths.

The first set of invitations was sent as emails to individual secondary school teachers listed in the New Zealand Enviroschools Programme database, access to which I was given through my chief supervisor's longstanding association with the organisation. Invitation emails were also sent to some selected school principals and individual teachers known to myself and my supervisors who we thought might be interested in this project. When the first set of invitations yielded only nine responses I broadened the search by posting an open invitation to all the teacher subject specialist user groups I could find on Facebook including; Secondary Teaching (NZ), DisruptED, Physical Education New Zealand, Education for Sustainability Discussion group for educators—NCEA, Kaitiakitanga Curriculum, Senior Geography Teachers NZ, New Zealand Physics teachers, New Zealand Technology Teachers, Outdoor Education Teachers Secondary (NZ), History teachers New Zealand, Stats teachers NZ, and NZ Maths Teachers. These Facebook social media posts included the final paragraph of the invitation text above but not the two opening bullet points.

A total of 28 teachers expressed an interest in the study and returned completed 'Informed Consent and Background Information' forms. Twenty-three of these went on to complete the first round of the Delphi Survey. The number and pseudonyms of the teachers who went on to complete each of the subsequent phases of the study are shown in Table 4-1 of the next chapter. The texts of the Enviroschools invitation cover email letter, the Facebook groups post and the 'Informed Consent and Background Information' form, are reproduced in full in Appendices A-1.1, A-1.2 and A-1.3. My role as the researcher in the development of a curriculum framework included the preparation of the theoretically based 'Minimal SWM Framework' that I wanted my participants to evaluate and then elaborate through an iterative co-constructive process. To maximise the likelihood of bridging subjectivities and differences of perspective in the recruitment process, I decided to defer any

mention of, or introduction to, the 'Minimal SWM Framework' until the first round Delphi Survey questionnaire.

## 3.5 A Minimal SWM Framework

### 3.5.1 Section Overview

The theoretically based minimal Sustainable Wellbeing Metacurriculum (SWM) Framework included three key design priorities. First, the framework would have to include an explicitly holistic cross-curricular component in a mutually complementary relationship with the traditional subject-based component of the secondary school timetable. Second, its epistemic structure would be based on the Triadic Sierpinski Fractal (TSF) described in Section 2.6.2.2 with its two levels, three pairs of corresponding domains and organising attractor at each level. Third, it had to encourage teachers' creative freedom in designing and adapting novel units of study relevant to their local contexts and students' interests without losing Sustainable Wellbeing as the primary focus of learning. The following three sections address how each of these design priorities was introduced to participants during the study for their evaluation, modification, and elaboration.

### 3.5.2 Cross-Curricular and Subject-Based Specialist Complementarity

The traditional subject-siloed approach to secondary schooling has been recognised as having a 'complexity reduction' effect, for example, by limiting opportunities for dialogue (Hetherington, 2013). Co-construction was envisaged as a vital permanent feature of the SWM framework metacurriculum, not restricted to just the research and developmental stage. To foster the level of lively creative energy necessary for this original transformative work, complex systems theory suggests permanently increasing the opportunities for teacher-professional interactions across disciplinary boundaries to encourage the emergence of the new curriculum, pedagogical, and assessment structures required for centring Sustainable Wellbeing effectively, potentially as a new pan-disciplinary speciality in its own right:

> The problems faced in a world of climate crisis and pandemic have shown that no single discipline is equal to the task of understanding. To address these issues, we need to be able to comprehend the interpenetration of social, individual, and ecological forces within systems. It is here that both the need and the foundation for inter-or postdisciplinarity became clear.
>
> (Byrne & Callaghan, 2022)

The Minimal SWM framework initially presented to the participants in this study, therefore, sought their views on the occurrence and the value of cross-curricular teams in their teaching practice. At the same time, specific subject-based knowledge, dispositions, and skills taught by individual subject specialist teachers are likely to remain indispensable to effective sustainable wellbeing schooling. 'Holistic' means, not just top-down causation, but causation in all directions within a system and between the system and its environment (Byrne & Callaghan, 2022).

Once fundamental values are agreed upon, the next steps for the co-construction of a practical implementable curriculum lead through principles and practice, knowledge, skills and attitudes, and eventually to a workable purpose-built timetable (Eyre & Watson, 2021). The Minimal SWM framework initially presented to the teacher participants, therefore, also sought their views on the

ideal timetable balance between Cross-Curricular Holistic (CCH) oriented lessons and Subject-Based Specialist (SBS) lessons.

### 3.5.3 The SWM Fractal Framework: Levels, Domains and Subdomains

In Section 2.6 I introduced a complexity model for the structure of a curriculum centred on Sustainable Wellbeing based on the Triadic Sierpinski Fractal (TSF) form. This form was my starting point for the co-construction of a secondary school metacurriculum that could comprehensively and coherently address the complex totality of the planetary system within which we must learn to sustainably nurture individual and collective wellbeing. The Triadic Sierpinski Fractal is proposed as a complexity-inspired curriculum device for continually transcending the myopic rigidity of disciplinary silos and at the same time providing teachers with a comprehensive epistemic framework for taming complexity in their local sustainable wellbeing curriculum design. This strategy is a research design application of the complexity theory principle of 'enabling constraints' and I was very aware of its inherent challenge, as Davis & Sumara (2010) warn teachers:

> As it turns out, the crafting of constraints that enable is among the most challenging tasks that educators encounter. It is easy to leave things too open or to impose structures that are too limiting. Moreover, it is not unusual for ideas that work brilliantly in one setting to fall flat on their face in another.
>
> (Davis & Sumara, 2010)

Table 3-1 shows the nine sections of the Delphi Survey first round questionnaire After the general introduction in section 1 the first priority for section 2 was to canvas teachers' views on the meaning of the key terms defining this study, 'Sustainability', 'Wellbeing', and 'Sustainable Wellbeing'. In section 3, the idea of a secondary school timetable with two distinct lesson modes, CCH and SBS, was introduced and teachers' views on the ideal balance between these modes were sought. In sections 4 and 5 the teachers were introduced to the two-level minimal domain structure for the SWM framework which I have illustrated in Table 3-2, for the Human-Societal (H-S) level and in Table 3-3 for the Individual-Interpersonal (I-I) level. At the H-S level, teachers were asked for suggestions of Knowledge, Issues, and Big Ideas to include, and at the I-I level, Skills, Competencies, and Dispositions for years 11 to 13 students to develop, in a Sustainable Wellbeing Metacurriculum.

The text descriptors for the Human-Societal Domains: Ecosphere, Social Justice, and Cultural Vision and the corresponding Individual-Interpersonal Domains: Action-Hands, Affect-Heart, and Cognition-Head shown appear as worded in the first questionnaire (apart from Social Justice which was originally 'Global Justice'), although both they and some of the domain names were later modified in the co-construction process. The principle of correspondence between the domains across levels was not made explicit to participants. The notion of the 'Integrating Self' at the Individual-Interpersonal level, implicitly conceptualised as corresponding to the concept of Sustainable Wellbeing at the Human-Societal level, was explicitly described for participants with the phrase, "The 'INTEGRATING-SELF', organises HANDS, HEART, and HEAD as a coherent whole". This section of the survey also included a question asking "What does the term 'Integrating-Self' mean to you?". The term 'attractor' was not used in communications with participants at any point during the study.

*Table 3-1 Sections of the First Delphi Survey Round Questionnaire*

| Section | Section Title |
|---|---|
| 1. | Introduction, Contents, and Email |
| 2. | The meaning of key terms to you |
| 3. | Interdisciplinary and Disciplinary school and curriculum structures |
| 4. | Sustainable Wellbeing at the Humankind and Societal level |
| 5. | Sustainable Wellbeing at the level of the Individual and their interpersonal Relationships |
| 6. | Toward a Sustainable Wellbeing Metacurriculum for your School |
| 7. | Local Community Support for a Sustainable Wellbeing Metacurriculum in your School |
| 8. | Nationwide Support for a Sustainable Wellbeing Metacurriculum |
| 9. | Survey Experience Feedback |

Table 3-2 and Table 3-3 also illustrate the underlying intended interpretive fractal structure—for teachers' domain-oriented content suggestions—of three subdomains in each domain using a colour scheme to reflect a potential self-similar, self-organising correspondence between each set of three subdomains and the three top-level domains. At this early phase of the study, the subdomain structure was treated as 'yet to be confirmed or disconfirmed' and no subdomain structure of any sort was suggested to the participants.

In Table 3-2 the Ecosphere (E), Social Justice (S), and Cultural Vision (C) domains are coloured green, red, and blue respectively. The subdomains within each domain have the same primary colour as their domain plus a secondary background colour related to their self-similar element in the level above, so that, for instance, the second Ecosphere subdomain colour is a mix of the green foreground and red background colours. The subdomain coding scheme follows the same structural logic where the first letter refers to the primary domain and the second letter to the secondary self-similar domain. The second Ecosphere subdomain is thus labelled ES, while the third Cultural Vision subdomain is labelled CC. The Social Justice domain was initially named 'Global Justice' in the first Delphi Survey round (see appendix B-1) but was subsequently renamed in response to participant feedback. I have used the final version of the name in this and all subsequent references to the domain to avoid potential confusion.

The colour and coding scheme for the Individual-Interpersonal subdomains in Table 3-3 follows the same pattern where I have labelled the three primary domains, Hands, Heart, and Head as A (Action), F (Feeling), and T (Thinking) to avoid coding ambiguity.

*Table 3-2 The Human-Societal level of the minimal Domain structure for an SWM framework*

| Level | Domain | SubD# | Subdomain titles | Subdomain Goals |
|---|---|---|---|---|
| Sustainable Wellbeing | | | | |
| Human-Societal | Ecosphere (E): refers to humanity's relationship with its planetary, ecological, and built environment. | | | |
| | | 1 (EE) | | |
| | | 2 (ES) | | |
| | | 3 (EC) | | |
| | Social Justice (S): refers to humanity's world of social, political, and community relationships. | | | |
| | | 1 (SE) | | |
| | | 2 (SS) | | |
| | | 3 (SC) | | |
| | Cultural Vision (C): refers to humanity's relationship with its own histories, its present, and its future. | | | |
| | | 1 (CE) | | |
| | | 2 (CS) | | |
| | | 3 (CC) | | |

### 3.5.4 Anchoring and Connected Subdomains

Whereas the minimal Sustainable Wellbeing Metacurriculum framework described above in Section 3.5.3 provides teachers and teaching teams with a durable, consistent, comprehensive structural overview of the curriculum for long-range planning, pedagogy at the single Unit and day-to-day teacher-student contact level must be responsive to changing circumstances and local contexts. In terms of this study's CT-CR-NM methodological position, the SWM framework domains and subdomains are informed by critical realism's concepts of structure, agency, and its TMSA Transformational Model of Social Activity. To facilitate and encourage teachers and teaching teams' creative use of the framework to engage their students in local and global issues of sustainable wellbeing, the notion of Anchoring and Connected subdomains was introduced in the third round of the Delphi Survey. In this round, teachers were asked to use the SWM framework that had emerged from the first two rounds to outline one unit of study they had recently taught, were teaching or were intending to teach. The Anchoring and Connected subdomains innovation was informed both by new materialism's fluid event-oriented rhizomatic assemblage conception and participant feedback in the study before round 3. The term 'subdomain' in this context should be understood to mean any element within the TSF structure of the SWM framework, including the domains and the central attractor itself.

*Table 3-3 The Individual-Interpersonal level of the minimal Domain structure for an SWM framework. Hands, Heart, Head; A-Action, F-Feeling, T-Thinking*

| Level | Domain | SubD# | Subdomain titles | Subdomain Goals |
|---|---|---|---|---|
| Integrating-Self: organises HANDS, HEART, and HEAD as a coherent whole. | | | | |
| Individual-Interpersonal | Action-Hands (A): refers to the Individual's physical relationships with their natural and built environment, other people, and their own body | | | |
| | | 1 (AA) | | |
| | | 2 (AF) | | |
| | | 3 (AT) | | |
| | Affect-Heart (F): refers to the Individual's emotional relationships with nature, others, and self. | | | |
| | | 1 (FA) | | |
| | | 2 (FF) | | |
| | | 3 (FT) | | |
| | Cognition-Head (T): refers to the Individual's sense perception-thought relationships with nature, others, and self. | | | |
| | | 1 (TA) | | |
| | | 2 (TF) | | |
| | | 3 (TT) | | |

In the Delphi survey round 3, teachers were asked to nominate the Anchoring SWM subdomain in which their Unit began and ended and the associated Sustainable Wellbeing Goals they wanted students to achieve relating to this subdomain. The Anchoring Subdomain could then be supported by as many subordinate Connected subdomains and selected associated subdomain goals as the planning teacher(s) decided were appropriate for their particular locale, context and priorities.

Figure 3-1 and Figure 3-2 illustrate hypothetical subdomain sequences that a particular Unit could follow. Figure 3-1 illustrates an introductory course for year 11 (16-year-old) students Anchored at the Sustainable Wellbeing Centre. The unit then explores each of the primary domains in turn including visits to each domain's connected subdomains before concluding back at the centre. Figure 3-2 illustrates a possible Unit for year 12 students anchored in the Ecosphere domain and connected to each of the Ecosphere subdomains with a particular emphasis on the Social Justice issues involved in each.

The following section describes and explains the reasoning behind the research design I employed, first to collect and incorporate my participants' suggestions for the elaboration of the minimal SWM framework and second to gather and understand their views on what school, community and nationwide factors in their experience as secondary school educators were most likely to enable the uptake of such a metacurriculum.

*Figure 3-1 Topic sequence for a hypothetical SWM Introductory course for year 11 students, **Anchored** at the Sustainable Wellbeing centre and **Connected** to all nine second strata Subdomains.*

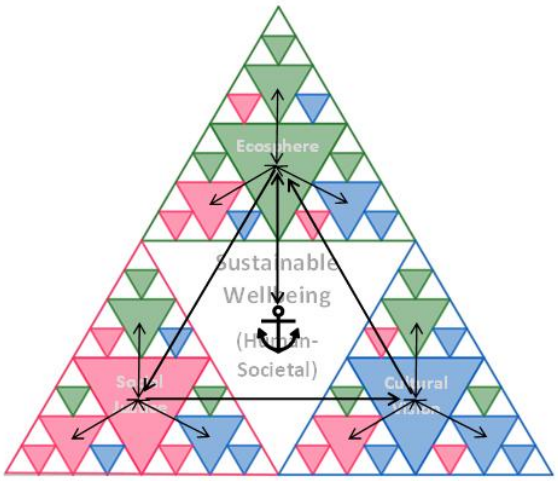
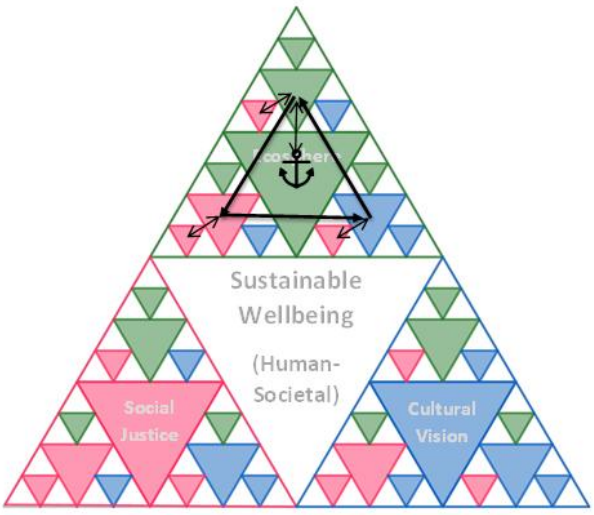



*Figure 3-2 Topic sequence for a hypthetical SWM Unit for year 12 students, Anchored in the Ecosphere Domain, with three Connected Ecosphere Subdomains and an emphasis on Social Justice*



## 3.6 Research Design

### 3.6.1 Section Overview

In this section, I describe the reasoning behind the choices for my research design, the instruments used to realise it and the techniques chosen for the analysis of the broad range of quantitative and qualitative data gathered.

### 3.6.2 A modified Delphi Survey

#### *3.6.2.1 Why a Delphi survey for this study?*

The choice of a Delphi Survey as the starting point for this study flowed directly from its main research question: What would enable secondary schools in Aotearoa New Zealand to establish a Sustainable Wellbeing centred Metacurriculum (SWM) for their years 11 to 13 students? Addressing this question would require:

- A group of experienced New Zealand secondary school teachers
- This group would need to be as representative of New Zealand secondary school teachers as possible, particularly as regards the diversity of their teaching subject specialities.
- The main research question implied the secondary question: What would/could a framework for an SWM co-constructed with teachers look like? This led in turn to the need for a cyclic participatory research design (Byrne & Callaghan, 2022) with rounds of teacher consultation interspersed with reflective periods for analysis of feedback, and the reporting of findings, framework modifications, and research design adjustments to the teachers in preparation for the following round of consultation.

A case study approach, based on focus groups and interviews such as World Cafes or Knowledge Cafes (J. Brown & Isaacs, 2005) was considered but rejected as the probability of finding a school principal willing to commit so much staff time to such an ambitious and sweeping early stage conceptual investigation was judged as slight. A Delphi Survey radically limits the opportunities for interactions among members of the research participant community compared to what might be achieved with the World Cafes design using reconvened focus groups. However, the likelihood of finding twenty to thirty individual teachers from a diverse range of schools across the country interested in Education for Sustainable Wellbeing seemed much better.

Delbecq et al. (1975) suggest three essential conditions are required for a Delphi Survey study to be a good choice of research design. There should be adequate time available (at least 45 days), participants should be skilled in written communication, and there should be high participant motivation. All these conditions could be met for this study.

#### *3.6.2.2 The Delphi Survey Design*

The Delphi method of inquiry, named after the oracle at Delphi of ancient Greece, was developed in the early 1950s by the Rand Corporation of America (Dalkey & Helmer, 1963). As Clark et al. (2020) explain, “the Delphi method uses written responses to an initial question or questions, which the researcher synthesizes to build group consensus related to their research focus” (p. 385). The Delphi method aims to improve group decision-making by obtaining and sharing participants' points of view anonymously through a series of questionnaires without face-to-face interaction. Each survey round questionnaire is built on the responses to the preceding round (Delbecq et al., 1975). The synthesis

and statistical analysis of each questionnaire is shared with participants before they answer the subsequent questionnaire. The process continues until consensus is reached or no further convergence of opinion is evident, a condition referred to as 'stability' by Wan & Bi (2020).

The design of my Delphi inquiry was based on three relatively recent studies and a fourth from 2003 (Clark et al., 2020; Osborne et al., 2003; Seo et al., 2020; Wan & Bi, 2020). In all cases, the researchers used three rounds of questionnaires, although Wan and Bi note that four rounds are also sometimes required. All four studies are curriculum-oriented and three are quite explicitly linked to sustainable wellbeing themes. Their findings, therefore, as well as their methodology, were highly relevant to my research.

As usual in a Delphi survey, as far as I knew, the participants in this study were unknown to one another. As it turned out, two of the teachers from separate schools in one city did know one another through their involvement in a shared Climate Action Campus school garden project. I have used pseudonyms to identify participants and protect identities throughout all reporting in this study. As the researcher, being able to track each participant's responses through all rounds of study was essential for two reasons. First, it facilitated an in-depth nuanced understanding of each teacher's views and their school context by being able to refer to all their contributions as one consistent thread. Second, it enabled a deeper understanding of the patterns emerging in the final distribution of positions on issues related to the SWM and the complex process of reaching that consensus. For example, when teachers were asked to rate the usefulness of aspects of the emerging SWM framework on a 5-point Likert scale. A small movement in the aggregate median rating between two survey rounds could be inferred to mean that the group consensus was stable. Being able to track individual responses, however, allows the researcher to check for any underlying instability (Osborne et al., 2003). The survey forms for the three rounds of my Delphi Survey are presented in full in appendices B-1, B-3, and C-2

#### *3.6.2.3 Why a Modified Delphi and How?*

The present study differs from most standard Delphi Survey studies in four ways. First, the research questions call for a deliberately broad, cross-curricular, complex system methodology exploring many issues related to an 'emergent' reorienting of the fundamental purpose and structures of secondary schooling, compared to the relatively narrow 'good practice' research focus of most Delphis. Second, the survey included a specific proposed minimal framework for Sustainable Wellbeing education that I was asking participants to evaluate and develop, rather than starting from first principles with questions like, What ideas about science should be taught in school science? (Osborne et al., 2003) or What Major "Socio-Scientific Topics" Should the Science Curriculum Focused on? (Wan & Bi, 2020).

Third, seeking the convergence of views on a strong consensus regarding particular aspects of the metacurriculum was not a primary objective of this study. Measures of consensus were still useful but I was aiming rather to understand the diversity of views within the Delphi panel on all the issues relevant to the research questions and to make that diversity visible to all members through my post-round summary reports. This approach was intended to foster a productive atmosphere of mutually respectful cooperative effort and lead to the co-construction of a robust, coherent SWM framework within which all teachers could see a productive role for themselves and their colleagues. Fourth, the Delphi Survey was part of a mixed methods design that also included semi-structured interviews and documentary data. One disadvantage of any survey-based research technique is that the relationship between the researcher and the research participants remains relatively impersonal. The researcher is constrained in the variety and scope of questions they can ask by the time participants are prepared

to commit to engaging in an asynchronous one-way conversation via forms on screens. These limitations were to a useful degree circumvented by augmenting the Delphi Survey design with additional narrative-building research techniques.

## 3.6.3 Semi-Structured Interviews

During my analysis of the second Delphi survey round, it became clear to me from the extent of some teachers' responses to the open-ended text-based survey questions, that they had a lot more to say about their experiences of teaching for sustainability and wellbeing and the school context within which they were working than they could tell me by responding to specific generic survey questions. I decided to postpone the planned third Delphi round and adopt a more narrative-oriented approach based on interviews and documents (including in two cases recorded publicly available webinars) that would allow me to more effectively explore the complex ways in which sustainable wellbeing education had developed and was continuing to evolve within these schools. Pivoting from a survey to a narrative research approach allowed those of my most engaged participants to exercise greater agency in deciding what they felt was important for me to understand about their specific settings, journeys and objectives related to their interpretation of Sustainable Wellbeing education:

> The narrative approach can relate history, context, and cause in terms of meaning without committing the violence of ultimate abstraction. It places engagement between researcher and researched at the core and recognizes an inherently dynamic field as stories emerge through the process of construction.
>
> (Byrne & Callaghan, 2022, p. 122)

In these conversations, I was brought, sometimes through a degree of cognitive dissonance, to a new appreciation for alternative understandings of key terms I was using such as ‘cross-curricular’. The semi-structured interview schedule is reproduced in Appendix C-1 and the analysis of these conversations is presented in Chapter 5 as a series of ten case study vignettes.

Other data sources that I used to develop these case study narratives about my participating teachers' schools and sustainable wellbeing work with students included information publicly available on school websites, school documents such as timetables and course outlines provided by my participants, direct personal communications through emails with participants responding to supplementary questions, and in two cases, transcripts of webinars teachers had given which were recorded and made available through the New Zealand Association of Environmental Educators (NZAEE) website. The relevant content from these document analyses is presented and referenced in Chapter 5 within each vignette where appropriate. An overview of the sequencing of the three main phases of the study including the research instruments used and the pseudonyms of the teachers remaining involved in each phase is presented in Chapter 4, Table 4-1.

## 3.6.4 Analysis

### *3.6.4.1 Section overview*

The findings of this study are based on a range of both quantitative and qualitative data consistent with both my complexity theory–critical realism–new materialism methodological synthesis and with the analytical techniques of ‘grounded theory’. “Grounded theory is a general method that can be

used on all data in whatever combination" (Glaser (1998) quoted in Byrne & Callaghan, 2022, p. 120). To coherently manage the varied data forms and data-collecting instruments I employed in this study, along with keeping an accurate chronological record of my communications with participants and of my daily research work and reflections on that process, I constructed a purpose-built relational database using the Claris FileMaker Pro (v19.3) program. This application comprised two linked relational databases. The 'SWM Contacts DB.fmp12' database stored all participant demographic and contact details and served as the definitive record of all participant study data across all data-gathering instruments. It was also the main device I used for the thematic analysis of text-based data. The 'Project Planner-Journal.fmp12' database is a chronological daily record of all work and reflections on all tasks related to the study throughout its duration. It also contains a record of and links to all documents generated related to the study filed by date and purpose.

In the process of addressing my research questions, I have combined statistical analysis of demographic data from 527 New Zealand senior secondary student-inclusive schools, with the thematic analysis of qualitative survey data from 23 teachers, and the narrative analysis of interviews and documents. The nationwide schools' data provides a positivist perspective on key demographic characteristics of the secondary schooling system in New Zealand comparing the 22 Study schools of the teachers who participated in this research out of their interest in education for Sustainable Wellbeing with the remaining 505 All-Other senior secondary student-inclusive schools. The details and conclusion from this analysis are presented in Section 6.2.

Teachers' views in the first Delphi Survey, on the most important factors enabling and constraining the potential implementation of an SWM, were analysed using text-based thematic coding aggregation to produce a small number (typically 5 to 10) categories of responses for each question which could then be compared in frequency tables and charts. The results and conclusions from this analysis are presented in Section 6.3.

#### *3.6.4.2 Principal Component Analysis with Qualitative Data*

The interviews and documents, supplemented by comment box responses to questions throughout the 3 Delphi Survey rounds, formed the basis of the mini case studies of actual Sustainable Wellbeing Units of learning in eight different schools presented as case study vignettes in Section 5.3. The narrative-thematic analysis of this data provided an interpretivist perspective on these participants' schools as unique complex social systems and an understanding of the characteristics they have in common that might inform us about the important features of an SWM attractor configuration for secondary school-level sustainable wellbeing education. Byrne and Callaghan (2022) refer to sets of such cases that belong to the same population as ensembles of systems representing attractors in the possibility space at a point in time. By interpreting the qualitative data of thematic analysis in the form of key factors and subjectively estimating the degree to which each case evinced each factor as a score or 'measurement', the researcher can then use multivariate statistical analysis to facilitate and refine the attractor's characterisation.

> The central purpose of measurement is to generate descriptive attributes which allow us to say something about the whole character of our cases as particular complex systems and to allow us to sort them into categories of kind.
>
> (Byrne & Callaghan, 2022, p. 129)

Based on my knowledge of eight of the case study schools I had formed an impression of how they ranked overall in terms of my conception of an SWM-convergent school. That conception was

emergent for me through an iterative process involving both the ongoing co-construction of the SWM framework and what I'd learned about the reality of these schools' actual priorities and challenges. My subjective rankings were related to specific relevant characteristics of the schools in each of the Sustainable Wellbeing Domains; Ecosphere, Social Justice, and Cultural Vision, which I was able to express as a list of 19 Key factors. Not so easy to determine was to what extent these factors were correlated or independent of one another in reality and how important each of them was in contributing to my overall rankings of schools. To assist in that determination I used the statistical techniques of Principal Component Analysis (PCA) and multiple linear regression.

Using a 5-point Likert scale (5 = strong on factor, 1= weak on factor), I subjectively scored each school on each factor relative to the other 7 schools. For instance, Table 3-4 shows five of eight schools' comparative factor scores for the key factor 'team teaching' and the evidential basis—from the surveys, interviews and documents provided by teachers—for these ratings. The full descriptor for this factor was: 'the extent of and structural support for Cross-Curricular Holistic (CCH) team teaching at all year levels in the school'. The mean of each school's nineteen factor scores then provided an independent way of deriving a ranking of the schools in terms of their proximity to the hypothetical SWM attractor configuration.

*Table 3-4 Five of the eight case study schools illustrating how the five levels of the comparative factor scores for the key factor 'team teaching' were aligned with the evidential basis for these ratings. Each school is identified by the pseudonym of its teacher study participant.*

| Teacher | Factor Score | Evidence supporting the Factor Score |
|---|---|---|
| Rebecca | 5 | Cross-curricular and team teaching are well-established at the school. Traditional SBS lessons occupy 90% of the timetable, but the school is considering reducing this share in favour of expanding the cross-curricular Te Ara programme. Of the schools included in this table, Rebecca's is currently the only one with a school-wide dedicated timetable space specifically for a comprehensive structured sustainability and wellbeing-oriented programme that all students take and which follows a systematic developmental progression through all its year levels from 7 to 13. Sustainable wellbeing is treated here not only as a learning area in its own right but also as a required discipline and the issue of potential timetable clashes with other learning areas doesn't arise. Four teachers including Rebecca, from the subject areas of sustainability, philosophy, Te Ao Māori, and Te Reo Māori provide the year 12 course. |
| Anita | 4 | The school is prepared to structure timetables to enable CCH team teaching. It also relies on the sustainability expertise of community organisations. Facilitating student choice and interests is valued highly by the school to the point that it can sometimes undermine the sequential development of students' subject-based knowledge and the completion of cross-curricular year-long Units such as 'Āhuarangi Climate'. With its three collaborating teachers and range of contributing learning areas, this Unit comes closest of the eight studied to being a small-scale example of what an SWM programme for year 11 might look like. |
| Brent | 3 | The school has a cross-curricular programme for years 9 and 10 students called the Innovation Stream Curriculum (ISC) which so far involves around 10% of the |

| Teacher | Factor Score | Evidence supporting the Factor Score |
|---|---|---|
| | | students in these year levels. Brent saw the school's ISC as having significantly increased both students' engagement and agency in their learning, and teachers' effectiveness through the opportunities for collaboration it provides. The ISC cross-curricular courses were structured around the four core subjects of English, Mathematics, Science, and Social studies combined pairwise with two of the other three subjects. The team teaching here required the constant physical presence of both collaborating teachers. |
| Daniel | 2 | Daniel is a registered teacher working or a small Trades Academy that became registered as an NCEA standards provider in 2023, offering short and longer horticultural-based courses for secondary school students at an as yet limited number of locations across mainly the North Island of New Zealand. According to its website, the Academy's mission is "to enable young people to make a living through enterprise while regenerating the planet and its people". Collaboration between the Academy's teachers and teachers in secondary school is already part of its business model. Daniel also relies on the Department of Conservation volunteers to help supervise and educate his students while on forest restoration field trips. |
| Nicola | 1 | Nicola valued the development of student agency through her commitment to hands-on projects outside of the classroom. She made extensive use of team teaching although this was limited to collaboration with academic staff and students from the local tertiary technical institute where her husband was a director. Facilitating and resourcing team teaching was less of a priority for her school leaders and colleagues. Only one other teacher at the school showed any interest in participating in Nicola's cross-curricular course project days despite being invited. The school was prepared to support the Education for Sustainability goals and cross-curricular activities of her 'Self-Watering Planter Boxes' Unit primarily because it enabled some students who were previously disengaged and not expected to gain NCEA level 1, to succeed. |

An iterative process of reconsideration and fine-tuning followed the initial assignment of overall rankings and factor score ratings in which I adjusted the three elements of this quantitative-qualitative comparison of the schools—i.e. my nineteen factor descriptors, the school factor relative scores, and the overall rankings—by continually reconsulting the data until the descriptors, overall rankings and factor score derived rankings were consistent and coherent.

Using PCA—Rotation Method Varimax with Kaiser Normalization—allowed me to reduce the 19 factors to five principal components (PC). PCA gives each factor a 'Component Score Coefficient' for each Principal Component. To assign each factor to a unique PC I chose the PC for which each had its highest absolute valued Component Score Coefficient after rotation.

These five principal components were then used as the independent variables to predict the schools' SWM proximity rankings using multiple linear regression. The PCA clarified the most important features of the emerging SWM attractor based on my data and the principal component regression coefficients helped to group all schools in the study into one of four categories, or what I have called

trajectories, based on their position within a hypothetical emerging SWM attractor configuration for New Zealand secondary schools. The findings of this analysis are presented in Sections 6.4 and 6.5.

#### *3.6.4.3 Quantitative*

Categorical, ordinal and continuous forms of quantitative data were all analysed for the nationwide schools' demographic variables comparison. Tests of significant associations between categorical variables, such as school gender type differences and Study versus All-Other schools, were made using the Fisher exact test (Crewson, 2016; Zaiontz, n.d.). The Fisher test is ideally suited to small contingency tables with low degrees of freedom such as these 2-by-2 tables where individual cells may have expected values of less than 5 and the Pearson chi-square statistic is not a reliable test of association. Since the Fisher algorithm is resource-intensive, the Zaiontz (n.d.) Fisher exact test macro for Excel limits the size of tables and the total number of cases that can be input. The largest dimensioned table allowed is 3 columns by 5 rows (with a maximum of just 30 cases). For larger contingency tables the Pearson Chi-Square test was used.

Ordinal 5-point Likert scales were used in the Delphi Survey to assess quantifiable judgments, for instance, teachers' evaluation of the usefulness of the emerging SWM framework for curriculum design. The evaluative descriptors (in this case, poor, fair, good, very good, excellent) were scored from 1 to 5 and a mean score and standard deviation were calculated. A standard deviation of less than 1.0 for a five-point Likert scale distribution (i.e. 20% of the full range of possible scores) has been accepted in similar studies as representing a high degree of consensus (Osborne et al., 2003).

The statistical significance of differences between continuous variables such as the total school roll of the Study compared to the All-Other schools was calculated using either the standard t-test to calculate 95% confidence limits for means, an estimated 95% Informal Confidence Interval (ICI) for medians (Wild et al., 2017; Wild, Horton, et al., 2011; Wild, Pfannkuch, et al., 2011), or the computational technique of re-randomization, also known as bootstrap resampling (Wild, Pfannkuch, et al., 2011) for either medians or means. The ICI for medians is based on the distribution Inter-Quartile Range (IQR) according to the formula:

$$ICI = median \pm 1.5 \times \frac{IQR}{\sqrt{n}}$$

Since there were only 22 schools represented in the participant Study group, the standard t-test 95% confidence limits were not always the most appropriate test to apply for the significance of differences between means. Sample sizes of less than 30 are considered small for statistical significance tests that assume normal distributions (Kwak & Kim, 2017). Again, re-randomization was used to estimate the statistical significance of differences in median and mean values. This technique—available on the NZgrapher website (Wills, n.d.)—does not require the assumption of normal distributions and has the added advantage of estimating the actual probability that the differences in median and mean values detected between groups could be simply due to chance.

#### *3.6.4.4 Qualitative*

The qualitative data I gathered was text-based either directly on the written response to the open-ended questions in the three Delphi Survey questionnaires or on the transcripts I made of the semi-structured interviews and webinar recordings. My approach to the analysis of this data was a modified version of grounded theory consistent with my modified version of the Delphi Survey technique.

Grounded theory was developed by Glaser and Strauss (1967), motivated by their desire to base social scientific theorising more firmly on engagement with empirical data than was common at that time. After 1967, Glaser and Strauss diverged in their interpretations of the 'grounded theory' they had developed together. Their opinions differed about the way prior influences on a researcher's theory-building should be handled (Byrne & Callaghan, 2022). Glaser continued to argue that the researcher needs to remain as free as possible from the influence of prior theorising and factual evidence in their field of interest—even to the extent of deliberately ignoring it—to remain free of influence from personal prejudices and favoured theories. My approach in this study is closer to that recommended by Strauss (Byrne & Callaghan, 2022; Strauss & Corbin, 1990) who maintained that the researcher cannot eliminate the influence of their own beliefs and a priori assumptions on their interpretation of the views of their research participants. To establish the trustworthiness of qualitative research, Strauss instead laid stress on transparency in the process of data gathering, presentation, and interpretation, through practices such as journaling, since this exposes findings and conclusions to potential challenges (Byrne & Callaghan, 2022).

Whereas the main aim of grounded theory analysis is to build an emergent set of categories and their properties out of the coding of text fragments using codes suggested entirely by the text itself (Byrne & Callaghan, 2022), my analysis began from the set of broad themes—related to the minimal SWM framework as described in Section 3.5—that participants were asked to address directly. Further themes and subthemes then emerged from the text analysis of participants' written and verbal contributions following standard grounded theory coding technique as the study developed through its three main phases (see Table 4-1). Using my 'SWM Contacts DB.fmp12' database I was able to crossreference every extracted text fragment with its participant code, research instrument item, all themes/subthemes to which it had been assigned, and the section(s) within my findings chapters where it was cited.

## 3.7 Trustworthiness

Trustworthiness in qualitative research performs the same function as validity and reliability in quantitative research (Cian, 2021). Other correspondences between qualitative and quantitative forms of validity include credibility, transferability, dependability, and confirmability replacing the concepts of internal validity, external validity, reliability and objectivity respectively (Cohen et al., 2017; citing Lincoln & Guba, 1985). Credibility has also been termed descriptive validity and described as equivalent to the factual accuracy of the account subsuming the quantitative concept of reliability. Transferability (external validity) is regarded as an essential element in quantitative research but in qualitative ethnographic research it is a lot less important and context is foregrounded since "human behaviour is infinitely complex, irreducible, socially situated and unique" (Cohen et al., 2017, p. 254). In complex systems-directed research with its emphasis on emergence and the characterisation of potentially generalizable attractors—such as the characterisation of the SWM attractor attempted in this study—both transferability and context are important. Transferability is a high-priority goal, however, the emergent properties of an attractor cannot be predefined, they must be drawn from rich data and immersion in the specific contexts of the cases studied. Furthermore, transferability cannot be easily established short of repeating a whole study with an entirely new group of participants in which case we would expect the new set of findings at best to intersect with rather than replicate previous studies, in the manner of one exploration of a large unknown land extending the map drawn by another earlier exploration, of a terrain, which is also evolving rapidly in time.

Cohen et al. (2017) observe that dependability is a synonym for reliability and that they are of equal importance in all forms of research with many equivalent bases including Stability, Parallel forms, and

Inter-rater reliability. The conditions of this study meant that investigating Stability was possible, but establishing Inter-rater reliability was not an option since I was working alone. Whether I would have made the same observations and interpretations if the study had been conducted at a different time seems very likely for the schools' demographic data but unlikely for the narrative data concerned with schools' relationship to education for sustainability, at least as regards my observations given the evolving and emergent nature of the phenomena. The Parallel forms basis for dependability asks "Would the same observations and interpretations have been made if other observations had been conducted at the time?" (Cohen et al., 2017, p. 271). It was concern for this form of dependability that motivated my research design modification to include interviews in addition to the Delphi Survey. My interviewees called my attention to many other relevant observations that I would not have thought to inquire about myself through the survey instrument. Doubtless, other relevant observations would have been made if I had been able to make on-site visits to the study schools, which were prevented by the Covid-19 pandemic.

The main means by which I approached the issue of dependability was through respondent validation specifically by reporting my findings and interpretations of the first two Delphi Survey rounds to participants and by seeking, recording and responding to their reactions as suggested by Cohen et al. (2017). In all rounds of the Delphi survey, text boxes for qualifying comments were provided wherever teachers were asked to rate or rank a prescribed set of options. For example, in the first Delphi round teachers were asked "What share of the weekly senior school timetable would you ideally like to see dedicated to cross-curricula Sustainable Wellbeing-directed learning as compared to specialised subject-directed learning?". A sliding scale with 10 levels from 0 to 100% was provided along with a text comment box with the invitation to add any comment on their choice. The findings from this question including the analysis of comments are presented in Section 4.4.2. In all three rounds, teachers were asked to rate the "usefulness" of the emerging framework for "thinking about sustainable wellbeing education" on a 5-point Likert scale, and again to qualify their rating with comment. The distribution of ratings and analysis of added commentary is presented in Section 5.5.2. During the study, participants were provided with progress reports of the findings from rounds 1 and 2 of the Delphi survey—5,432 and 11,483 words respectively. Separate preparatory documentation introducing the goals and direction of the next phase of the study was sent before the second round, the interviews, and in an email before the third Delphi round. I did not ask directly for feedback on these reports at any point. In retrospect, this was probably a missed opportunity although I was very conscious at the time of not wanting to overburden my participants with too many questions. Among the numerous unsolicited affirming comments for the project itself, only one teacher, Rebecca, directly referred to any of these support documents writing, "[It] was great to read the findings of the first survey. Thanks for sharing.".

Quantitative scientific research may be regarded as inherently more objective than qualitative social scientific research but as Longino (1990) argues consistent with the transitive-intransitive distinction of critical realism, it is precisely the social nature of scientific knowledge, peer review and refutability that enables its objectivity, noting that, "A method of inquiry is objective to the degree that it permits *transformative criticism*" (p. 76). Confirmability through clear audit trails is the qualitative equivalent of quantitative objectivity providing evidence of rigour in the research process and methods. From the extensive journaling of my research process and analysis, I have built and maintained an audit trail which has provided the opportunity for transformative criticism, particularly from my supervisors, throughout this research. The dated journal entries record all meetings with my supervisors and all their written feedback on my interim reports to participants and the chapters of my thesis. All meetings were recorded for later reflection and most were also transcribed and edited. The associated text files are linked to my database journal entries.

I have used Morrow's (2005) suggestions for meeting criteria for trustworthiness for identifying limitations in my research design. For instance, the number of participants I was able to recruit was certainly manageable but at 23 in total, somewhat fewer than the ideal for a Delphi survey of 30-40, given that attrition between rounds is commonly reported in Delphi Surveys. Participation over the three phases of my survey went from 22 to 14 to 9 albeit four of those nine in phase three provided interviews or webinar recordings rather than completing the third Delphi survey. Attention to the time demands I was making on participants was a continual balancing exercise between obtaining as much rich data relevant to the ambitious goals of this project and not losing participants to 'burn-out'. Each round of the Delphi included a closing question designed to gauge the time demanded against the teachers' expectations.

An example of gaining 'disconfirming evidence' (of one's own biases) was provided by one highly engaged participant, Brent, who was the only teacher to directly challenge the domain structure I had prescribed for the minimal SWM framework. In the first Delphi survey round, in response to the question 'Considering the implementation of a Sustainable Wellbeing Metacurriculum for years 11 to 13 students in your school: What might be the key CONSTRAINING factor(s) in your school?' he wrote: "Why these domains why these capabilities? Who says this is what our students will need to be successful lifelong learners?". Later I discovered in my interview with Brent that his school had a well-established 'Innovation Stream' for year 9 and 10 students which he described as "true cross-curricular". The structure of that curriculum was very different, however, from what I had had in mind when I first used the phrase 'cross-curricular' in that survey. This led me to a state of cognitive dissonance when analysing Brent's interview transcript which was eventually resolved by accessing documentation about the 'Innovation Stream' available through the school's website. I discuss my conversation with Brent and the transformative learning it afforded me, in more detail in Section 5.3.11. The conception of 'cross-curricular timetable share' also provides an example of 'providing adequate discrepant case analysis'. Teachers varied a great deal (i.e. from 0% to 100%) in their views on what proportion of the secondary school timetable should be devoted to 'cross-curricular holistic' as contrasted with 'subject-based specialist' lessons, and on how 'cross-curricular' lessons should be provided. These findings, presented in Section 4.4.2, demonstrate just how complex the challenge of fostering collaborative cross-curricular collegial relations can be in high schools given the diversity of teachers' preferred pedagogical styles. This diversity is all the more remarkable when one recalls that this panel of teachers was self-selected based on a common interest in education for sustainability and wellbeing.

## 3.8 Ethics

### 3.8.1 What are Research Ethics?

The first ethical responsibility of the researcher is to the sustainable wellbeing of his research participants and environment in so far as that is related to the research project. In my case working with adult professional participants exclusively through online communication channels, participant wellbeing required informed consent. The formal letters of invitation included the information that data would be collected using a Delphi Survey of three to four rounds; that data security was assured; that they could withdraw from the study at any time and have any data they had provided deleted within 48 hours of its collection; that participant anonymity would be maintained as far as possible; and about what the time and energy demands placed on participants would likely be. Managing the time and energy demand on participants relative to their expectations was an ongoing ethical requirement but also crucial for maintaining engagement and the success of the study. From the

outset, the fundamentally, ethically oriented objective of this research—to explore pathways toward a metacurriculum centred on sustainable wellbeing for secondary schools—was presented as the principal reason for being involved along with the opportunity to be involved in a collaborative process of curriculum design. The letter of invitation also included the undertaking to provide, consistent with the Delphi survey design, interim reports of findings to all participants between rounds, and a copy of the final thesis document upon completion of the study.

A copy of the formal letter of invitation sent to the Enviroschools contacts list is shown in Appendix A-1.1. A copy of the Research Ethics Committee Application Approval for this PhD study dated 23 October 2020 is included in Appendix A-2 and the memo extending this approval to include the semi-structured interviews in the research design that was received on 27 September 2021, is in Appendix A-3.

### 3.8.2 The Ethics of Participant Agency

Heron (1996) argues that limiting research participants' agency in a study to informed consent is fundamentally unethical:

> To generate knowledge about persons without their full participation in deciding how to generate it, is to misrepresent their personhood and to abuse by neglect their capacity for autonomous intentionality. It is fundamentally unethical.
>
> (p. 3)

My research approach lies somewhere between what Heron (1996) describes as "classic Qualitative research about people" and "Participative research with people". In the former the researcher's *Political participation*, i.e. their involvement in research thinking and decision-making is 'full' while the participants' is 'partial'; and the researcher's *Epistemic participation*, i.e. their involvement in the experiences and action being researched, is 'partial' while the participants' is 'full'. In the latter, both parties are fully involved both politically and epistemically. Heron (1996, p. 10) concedes that participants may not want full research design involvement simply because they "are just too busy with their various enterprises to be able or willing to participate in designing a study of themselves [but] that that is for them to decide.".

These conditions certainly held for my study in which I as the researcher knew only one of the participating teachers before the study, and—as far as I could determine at the outset of the study—none of the participants was known to any other; I made no on-site visits to any of my participants' schools during the study (although I had worked at one and visited another previously); and I was already depending hugely on these teachers' generosity with their time without also burdening them unnecessarily with research design details. Most importantly, I would argue, the participants were fully expressing their agency as professionals through volunteering for a study, the ultimate purpose of which they clearly understood. I also made clear to participants that the theoretical minimal SWM framework was based on my reading of the relevant literature and made explicit my objectives, beliefs and a priori assumptions. As such the minimal SWM framework was an object of the research that the teachers were invited to critique, evaluate and build upon.

### 3.8.3 The ethical mission of the study

Given the values and moral aspirations of this study, there is one more ethical issue worth noting. A 'Sustainable Wellbeing Metacurriculum', however well designed as a planetary-attuned system of education, cannot be represented as a 'solution to the problem' in and of itself.

> Complexity theory (and postmodernism), of course, cannot devise a better ethical system, or at least not a system that will solve the problem. What it can do however, is to show that when we deal with complexity–and in the social and human domain we always do –we cannot escape the moment of choice, and that we are never free of normative considerations. Whatever we do has ethical implications, yet we cannot call on external principles to resolve our dilemmas in a final way.
>
> (Heylighen et al., 2006, p. 17)

This project is motivated by the belief that a better education system configuration than our current BaU model can be devised and that the synthesis of complexity theory with critical realism and new materialism provides a research methodology well suited to this mission. Nevertheless, the accumulating ethical choices of all of society's members and our free agency will ultimately determine whether education for Sustainable Wellbeing continues to evolve through co-construction long enough to reach a tipping point into a Sustainable Wellbeing configuration which is self-organising and self-sustaining.

## 3.9 Methodology Summary

In this chapter, I have set out the philosophy underpinning this study, the research design through which it was realised, and the measures taken to ensure it will be judged trustworthy and ethical. I have described how the SWM is ontologically, epistemologically, and axiologically positioned relative to a paradigmatic synthesis of complexity theory, critical realism, and new materialism which I've labelled CT-CR-NM.

My research approach is empirical transformative in that it explicitly aims to assist New Zealand's transformation from an unsustainable late 20$^{th}$-century business-as-usual secondary schooling model toward a future of sustainable wellbeing through an evidence-based understanding of the realities of this country's educational culture in the second decade of the 21$^{st}$ century. My research approach is participatory in that there are no research 'subjects' and I as the researcher and the teachers who volunteered to join the study form a self-selected community of inquiry effectively united through our mutual interest in furthering a metacurriculum centred on sustainable wellbeing.

By including the phrase 'Sustainable Wellbeing centred Metacurriculum', my main research question necessarily required the secondary question 'What would/could a framework for an SWM co-constructed with teachers look like?'. To facilitate co-construction, at the outset of the study, I introduced a theoretically based 'minimal SWM framework'—as outlined in Section 3.5—which I asked my teacher participants to evaluate and develop. A co-construction process also suggested a cyclic participatory research design and a Delphi Survey was the ideal solution since there was adequate time available for at least three rounds; my participants would all be skilled in written communication and would be drawn from schools throughout New Zealand; and the self-selection recruitment process meant there would be high participant motivation. A modified Delphi survey research design was adopted for this study.

I have drawn on a wide range of data types in addressing my research questions which have consequently required a mix of quantitative and qualitative analytical techniques. This has included a hybrid combination of grounded theory coding with principal component analysis used to examine and characterise the nature of a possible SWM complex system attractor for Stainability and Wellbeing education based on eight whole school context case study narratives.

The Trustworthiness of my research methods relies on the principle of demonstrating objectivity through inviting, enabling, and recording transformative criticism at every stage of the project, underpinned by the practice of journaling. A digital database was used to create a chronological record of progress throughout the project—including reflections on my interpretations of the data and how they developed—linked with all data gathered, analyses performed, decisions made, and documents generated. The ethics of this study have been guided by the principle that respecting participants' informed consent includes facilitating their capacity for autonomous intentionality in the way the data was collected and interpreted while limiting the demands placed on their generously provided time and attention to detail.

The following three chapters present what I have learned from the 23 teachers who participated in this study about what would enable secondary schools in Aotearoa New Zealand to establish a Sustainable Wellbeing centred Metacurriculum (SWM) for their years 11 to 13 students. Chapter 4 deals with the construction process of the SWM framework from the initial minimal framework through to the end of the second Delphi survey round and before the round of semi-structured interviews. Chapter Five, the largest of the three, covers how the developed SWM framework was used to outline and characterise Units of work the study participants were currently teaching or planning to teach, including their links to the New Zealand Curriculum (NZC) and the National Certificate of Educational Achievement (NCEA). The chapter includes ten case study vignettes that describe the wider school context within which each teacher was working as well as their evaluations of the usefulness of the SWM framework itself. Chapter Six addresses the nationwide scope of the main research question. It shows how the schools represented by my research participants compare demographically with Aotearoa New Zealand secondary schools in general. The key factors—in the view of the participating teachers—that enable and or constrain the possible acceptance of an SWM in schools, communities, and nationwide are also presented. The chapter concludes with a characterisation of the hypothetical SWM attractor for the transformation of secondary schools in this country in terms of five principal components.

# Chapter 4 Co-constructing an Sustainable Wellbeing Metacurriculum Framework

## 4.1 Overview

In this Chapter, I describe the opening phases of the study where the first research sub-question—What would/could a framework for a Sustainable Wellbeing Metacurriculum (SWM) co-constructed with teachers look like?—was the main focus. The chapter begins with the profiling of the panel of experienced teachers, in terms of their relevant demographic and professional characteristics. The first step toward co-construction was to gain an idea of how the participants interpreted the key terms Sustainability and Wellbeing. These findings are presented in Section 4.3. Section 4.4 reports on how the teachers viewed the optimal balance between Cross-Curricular Holistic (CCH) and Subject-Based Specialist (SBS) pedagogies for a metacurriculum centred on Sustainable Wellbeing. Section 4.5 then recounts how a coherent three-level framework of domains, subdomains, and Outcome Goal Descriptors—which could be applied in both CCH and SBS Unit planning—emerged from the first two rounds of the Delphi Survey. This framework was subsequently used by nine teachers—the Core Participants—in the last phase of the study, as described in Chapter 5, to frame courses and projects for Sustainable Wellbeing that they were currently teaching or planning to teach, linked to both the Achievement Objectives of the New Zealand Curriculum (NZC) and the Standards of the National Certificate of Educational Achievement (NCEA) New Zealand's school leaving qualification.

## 4.2 Participant backgrounds and duration of Participation

In all, 75 Individual invitation emails were sent and sixteen 'Informed Consent and Background Information' forms were returned, i.e. a 21% acceptance rate. Nineteen teachers responded with interest to the Facebook user group posts and twelve of these, 63%, subsequently returned 'Informed Consent and Background Information' forms. Of the total twenty-eight teachers who provided consent forms, five went no further with the study. Twenty-two teachers completed the first round of the Delphi Survey. Fourteen teachers completed the second round of the Survey, including one who had not been involved in the first round. Nine of these fourteen, whom I have called the Core Participants, went on to the third round of the survey and, or otherwise, provided additional information to the study through one-to-one semi-structured interviews, webinar presentation recordings or other documentary data. The contributions of these Core participants are the focus of Chapter 5, Using the Sustainable Wellbeing Framework.

In Table 4-1, I have shown—using pseudonyms in the left-hand column—the twenty-three teachers who agreed to participate in this study divided into three 'Participation Groups'. These groups are based on how long each teacher remained in the study and how many rounds of the co-construction stage they contributed to as shown by the three Study Phase columns on the right of the table.

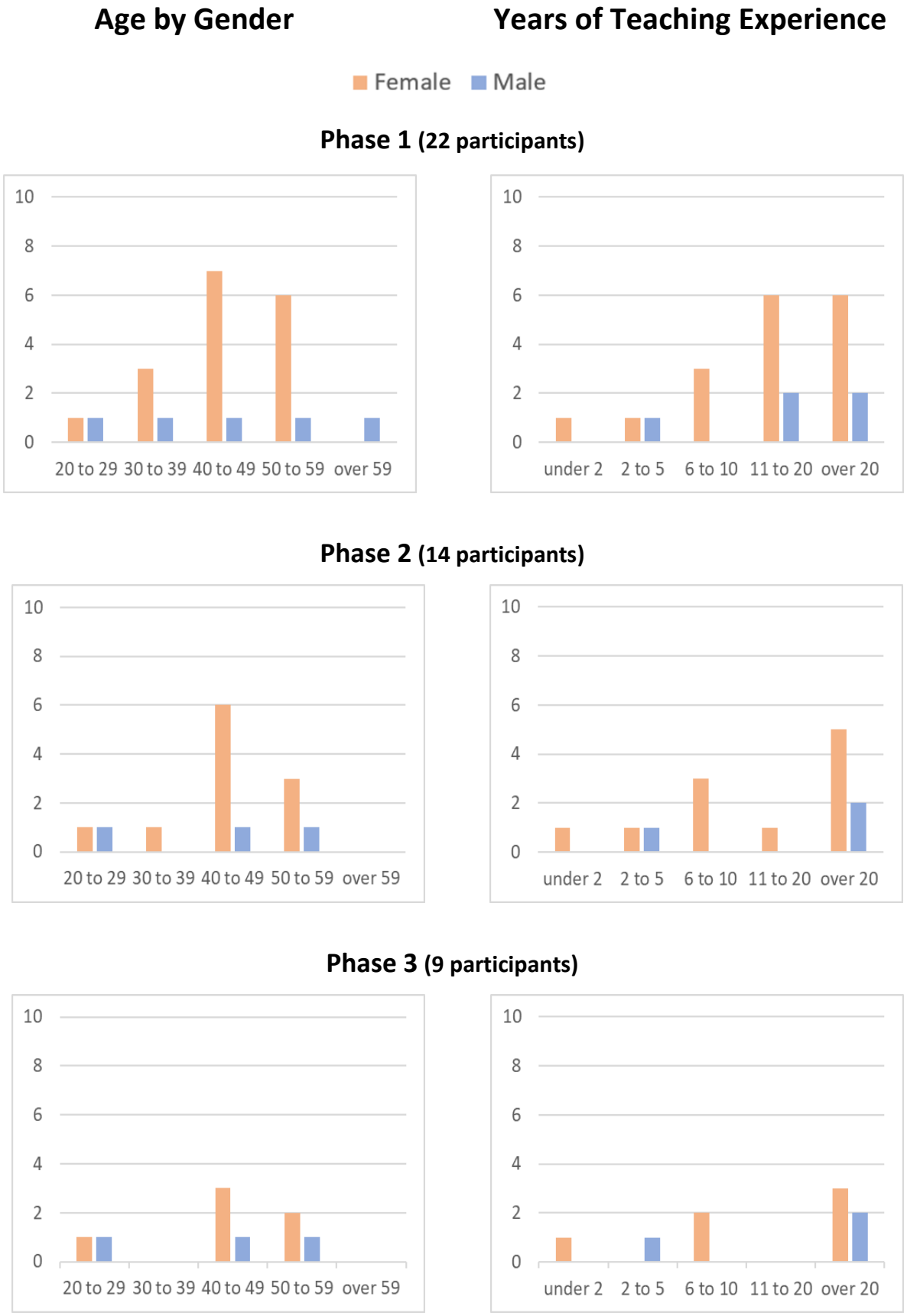
*Table 4-1 The three post recruitment Study Phases showing the research instruments used in each phase and the phases to which each of the participating teachers (pseudonyms) contributed.*

| **Phase** | **1** | **2** | **3** |
|---|---|---|---|
| **From** | 16 Mar | 8 Aug | 2 Nov 2021 |
| **To** | 7 Aug 2021 | 1 Nov 2021 | 6 Jun 2022 |
| **Number of Participants** | **22** | **14** | **9** |
| **Instruments and Participants** | | | |
| **Delphi#1**<br>Completed Delphi Survey #1. | | | |
| **Amber, Anthony, Bridget, Brittany, Gemma, Megan, Philippa, Simon, Tracey** | | | |
| **Delphi#2**<br>Completed Delphi Surveys #1 and #2 (Apart from Belinda who only joined the study for round #2). | | | |
| **(Belinda), Bronwyn, Holly, Lucy, Stephanie** | | | |
| **Delphi#3+ Interviews etc. (the Core Participants)**<br>Completed Delphi Surveys #1 and #2 and also gave an interview or provided other documentary data (Phase 3.1), and/or completed Delphi Survey #3 (Phase 3.2, 25 January to 6 June 2022). | | | |
| **Anita, Brent, Claire, Daniel, Deb, Mathew, Nicola, Rebecca, Tara** | | | |

The Consent and Background forms completed by all teachers in the study requested information on their Age range, Gender, Ethnicity, Years of Teaching experience, Position of responsibility, and Areas of Subject teaching Expertise. The following four figures show that the study participants are a diverse and representative sample of teachers across all these attributes—apart from ethnicity—and that this breadth of representation was by and large maintained across the three study phases as the number of participants fell. All 23 teachers identified as either Pākehā/New Zealander or of European ancestry.

Figure 4-1 shows the participants' Age range distributions by Gender on the left and their Years of Teaching Experience distributions on the right. The teachers' ages are roughly normally distributed around the median 40 to 49-year-old group through all phases with the over-59 group dropping out completely after the first Delphi Survey round and the 30-39 group after the second round in phase 3.

*Figure 4-1 Age by Gender and Years of Teaching Experience distributions for the three Study Phases*



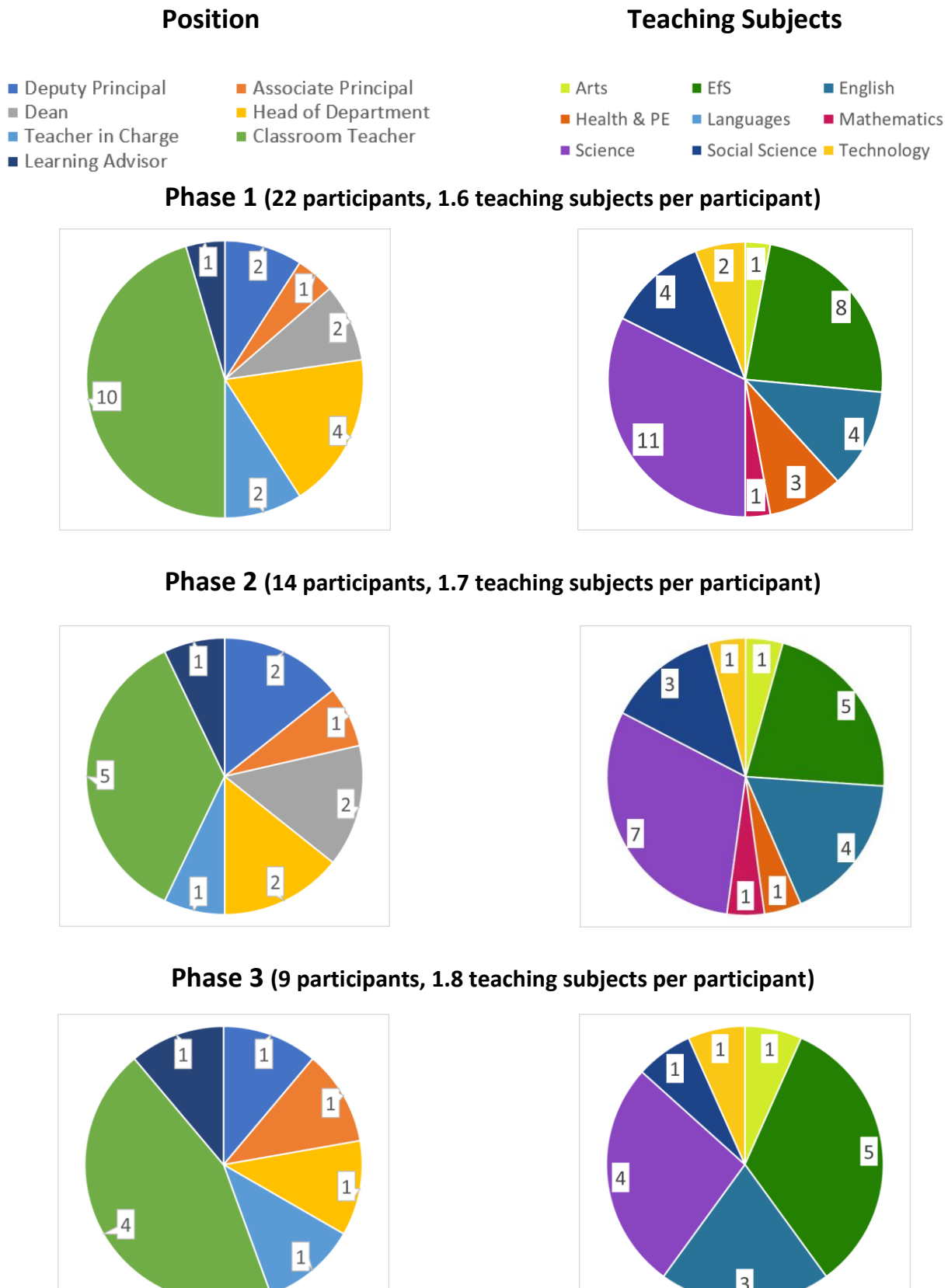
The ‘Years of Teaching Experience’ groups (horizontal scale) are of variable width and these distributions are far from normal. The ‘over 20’ years of experience group remains the modal group throughout all three phases while 11-20 years is the median group throughout even as it steadily loses members to end with none in phase 3. Perhaps teachers in that phase of their careers are most committed to the status quo conceptions of schooling and the least likely to contemplate radical innovations such as the SWM. The female-to-male teacher ratio was 3 to 1 for the first two phases but fell to 2 to 1 in the Phase 3 Core Participants’ group.

Figure 4-2 shows the distributions of participants’ positions of responsibility and teaching subject learning areas for the three phases of the study. The positions of responsibility sectors are ordered by degree of authority clockwise from deputy principals at the top right of centre, through to learning advisors. Classroom teachers are the modal group across all phases but were never more than 45% of the participants in any phase. Representation across the full range of positions was maintained through all three phases although the Assistant HoD category dropped out after Phase 1, although there were no Deans in the Core participants group of Phase 3. This is an encouraging finding in terms of the study objective that the co-constructed SWM framework should include the perspective of all levels of the secondary schooling collegial hierarchy. No school principals were among the participants, however.

From a metacurriculum design point of view, the research objective was to include teachers from all specialist subjects and learning areas. The right-hand column of Figure 4-2 shows the range of the participants’ teaching subject learning areas. Since the first principle of the SWM as a pandisciplinary knowledge system is to place Sustainable Wellbeing at the centre of the curriculum, I have included Education for Sustainability (EfS) as a learning area in its own right in this figure. EfS is classed as a subject within the Social Sciences learning area in the NZC. In the NQF (National Qualifications Framework which includes the NCEA) it is classed as a domain (Environmental Sustainability) within the Science subfield. A third of the Phase 1 teachers (8 out of 22) and more than half of the Phase 3 teachers (5 out of 9) identified EfS as one of their “current teaching subjects”. Almost half the Phase 1 teachers nominated two or more teaching subjects. By Phase 3 this proportion had increased to over half. Although the range of subject areas represented in this participant panel is broad, Languages (other than English) are conspicuous by their absence. Also notable is the underrepresentation of Mathematics and Health and Physical Education specialists. One participant named both Mathematics and Health and Physical Education as teaching subjects, but they did not continue to Phase 3 of the study.

In Phase 1, the participating teachers' schools were located in ten of New Zealand’s sixteen Regional Council jurisdictions. South Island schools were somewhat overrepresented on a pro-rata basis in all three phases of the study. The South Island is home to only 25% of New Zealand’s total population but provided more than a third of the study schools in Phases 1 and 3 and more than 40% in Phase 2.

*Figure 4-2 Positions of Responsibility and Teaching Subjects Learning Areas by Number of participants for the three Study Phases*



## 4.3 The Meaning of Key Terms

### 4.3.1 Section Overview

The title of this study contains the phrase “Toward a Sustainable Wellbeing Metacurriculum”. The first task of the first Delphi Survey (Delphi 1) was to gain an understanding of what meanings and associations the keywords in this phrase evoked for the teacher participants and to share that understanding with them before the second survey (Delphi 2). The traditional Delphi Survey objective of improving consensus about the meaning of key terms through successive survey rounds was not the highest priority in this study. Rather the objective was to co-construct a framework for Sustainable Wellbeing education that could accommodate all points of view and facilitate ongoing work toward the understanding of their relationality through the minimal domain structure introduced in Section 3.5 to gain a larger shared perspective. Teachers were asked to consider first the words ‘'Sustainability' and ‘Wellbeing’ in isolation and then the combined phrase ‘Sustainable Wellbeing’. Finally, they were asked to give their interpretation of the relatively unfamiliar term ‘Metacurriculum’.

### 4.3.2 Sustainability

All twenty-two Delphi 1 panellists responded to the question: What does the word 'Sustainability' mean to you? The responses were analysed in two ways. The first identified six distinct themes of importance to teachers. The second looked for references to the dimensions of Sustainable Development—economic, social and environmental—as they are defined by the United Nations (United Nations, 2015) or by the New Zealand Ministry of Education in its online Education for Sustainability resources (NZ Ministry of Education, 2015a) as reviewed in Section 2.4.2.

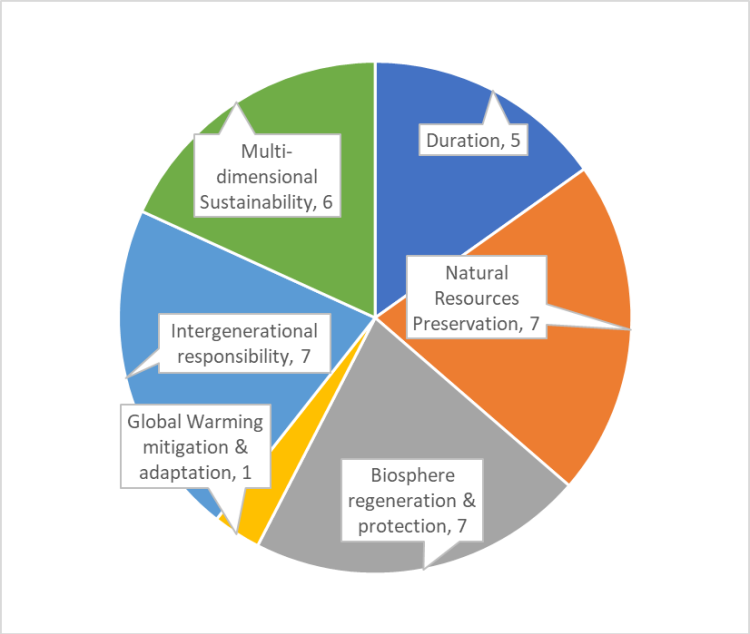
The six important themes for the participants in this study are shown in Figure 4-3 with the number of references to each. Seven teachers contributed to two or more of these themes. Seven participants described the environment as a resource base that must be preserved for the consumption and industry of human beings. Holly for instance wrote, “Sustainability is living in a way that preserves and maintains our natural resources.” For five of these teachers, this was their only association with ‘sustainability’. Seven described Sustainability in terms of Biospheric regeneration and all also included other aspects of sustainability such as ‘intergenerational responsibility’. Bridget for example described Sustainability as, “Looking after our non-renewable resources to restore biodiversity to our planet's ecosystems”

The wellbeing of future generations as an ‘intergenerational responsibility’ was mentioned by seven teachers, like Tracey who defined Sustainability as “Meeting our needs now while also making sure that resources will be available for future generations.” Six teachers referred to the dictionary association of Sustainability with Duration and Durability. Anthony for instance wrote, “Sustainability is something that can maintain or be maintained in its current state and cope with fluctuations without there being an overall or long-term impact.” Only one teacher, Claire, explicitly mentioned global warming writing—“Immediately I think of global warming and building a sustainable environment,”. No one used ‘Climate Change’—as a term at this point in the survey.

Sustainability as a multi-dimensional attribute of systems was mentioned by six teachers, and five of these also contributed to the other meanings shown in Figure 4-3. Megan’s thoughts were typical of this conception of Sustainability. She wrote:

For me, the basic pillars of sustainability are economic, environmental, social and cultural, mirroring what is stated in the NZ curriculum. All four pillars are linked, supporting each other and cannot exist without each other. All pillars must be robust and in balance so that the physical systems and life on Earth can function and thrive for millennia. Ko au te whenua, te whenua ko au (I am the land and the land is me).

*Figure 4-3 The meanings of 'Sustainability' showing the number of referrences to each*

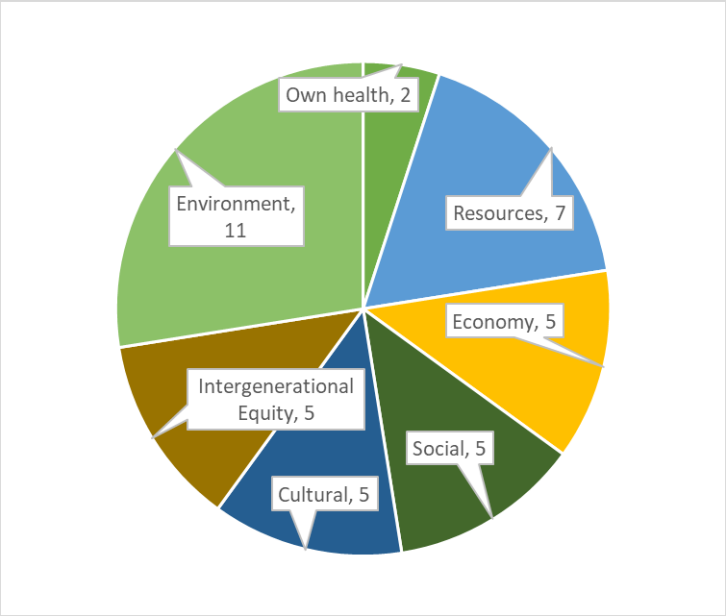



As discussed in Section 2.4.3, the decision to not name “the Economy” as an independent domain in the SWM framework had been taken on theoretical grounds before any data was collected. Because I wanted to know how important Economics was as a pillar of Sustainability in the minds of my study participants, the questions about Sustainability and the other key terms were asked in section 1 of the Delphi 1 Survey before the three predetermined SWM framework domains—Ecosphere, Social Justice, and Cultural Vision—were introduced in section 2. It should also be noted here that the ‘Social Justice’ domain was originally referred to as ‘Global Justice’. The change to ‘Social Justice’ was a late modification to the framework—not made until the analysis stage of the third Delphi survey round—to reflect that Social Justice in relationships at all levels from global to local is covered by this domain. To avoid confusion, however, I have used the later version of this domain name throughout this text.

In Figure 4-4 I have shown the distribution of the number of references to concepts that could be conceived of as ‘Dimensions of Sustainability’ in teachers' responses to the ‘meaning of Sustainability' question. There were five references to “economy”, or “economics” (including one to “finance”) and all were within the theme of ‘Multi-dimensional Sustainability’, as one in a list of domains as in Megan’s statement above. This was also true of the words “Social” and “Cultural”. The words “Environment” or “Environmental” also appeared in these lists but it was the only traditional domain to also be mentioned in other contexts, three times in connection with ‘Biosphere regeneration and protection’ and once in connection with ‘Global Warming’. The SWM Ecosphere domain includes

'Environment', and 'Natural Resources', and is treated as being ultimately the foundation of all human economic activity. These understandings of the domains of Sustainability comprise 50% of Figure 4-4. This bias toward an Ecospheric interpretation of Sustainability was apparent throughout the study.

*Figure 4-4 Suggested Dimensions of Sustainability by number of references*

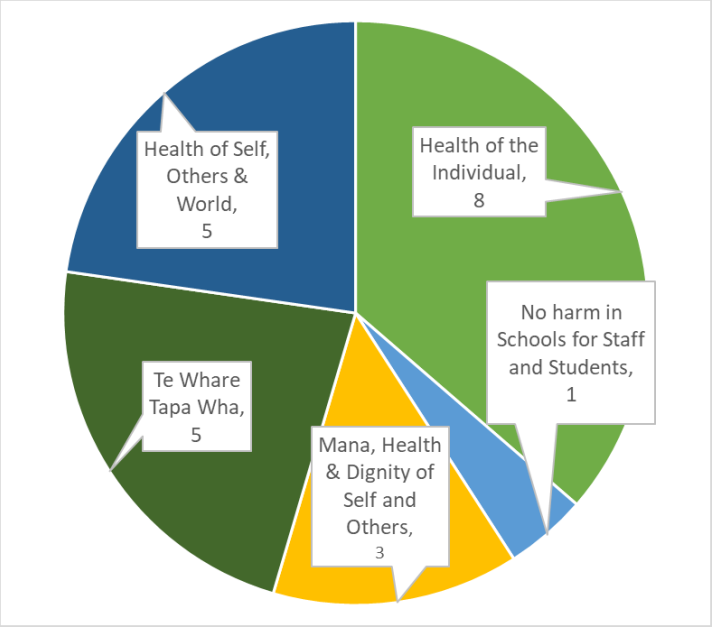



## 4.3.3 Wellbeing

Five themes were identified for the meaning of 'Wellbeing' representing mutually exclusive categories to which teachers could be assigned as displayed in Figure 4-5. The 22 teachers all saw Wellbeing as fundamentally an attribute of the individual self and the themes reflect the diversity of ways in which they thought of the self and its wellbeing. In Figure 4-5 the five themes are ordered clockwise by increasing expansiveness in what the Self and its Wellbeing are understood to include. Eight teachers —36%, the largest single subgroup—described wellbeing exclusively in terms of 'Health of the Individual'. Claire, for instance, wrote "Looking after yourself to have less stress, less pressure and have a generally happy and contented outlook on life." Four panellists extended the idea of Wellbeing to include interpersonal relationships. Simon wrote "staff and students being able to continue with their activities without suffering undue effects from the activity or the infrastructure that enforces or facilitates the activity" and Amber wrote, "Safeguarding the mana, health and dignity of ourselves, and extending that to others in a way that builds us all up."

Mason Durie's Te whare tapa whā model (Durie, 2009) —as discussed in Section 2.4.7.2 and mentioned in Section 2.4.6 as the basis of the concept of Hauora embedded in the Health and Physical education learning area of the New Zealand curriculum (New Zealand Ministry of Education, 2007)— was frequently mentioned by teachers either directly or indirectly, by referencing Durie's four aspects of Wellbeing, both in response to this question and throughout the study.

*Figure 4-5 Themes for the meanings of 'Wellbeing' showing the number of teachers referring to each, n=22*




Five teachers went even further to explicitly include the idea of human wellbeing as requiring environmental wellbeing. Megan, for instance, wrote:

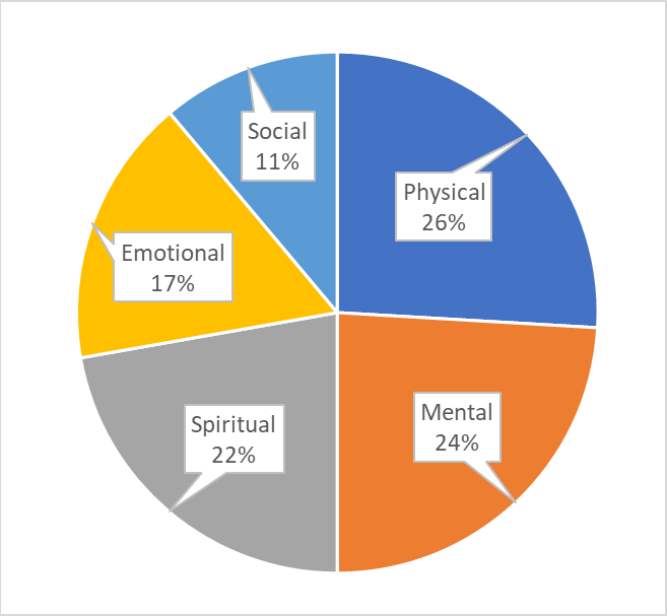
> 'Hauora' is the word that comes to mind when I think of 'Wellbeing'. Hauora encompasses the physical, mental emotional, social, and spiritual dimensions. All dimensions need to be strong and in balance to enable people to contribute and support others. Wellbeing must also be applied to physical systems e.g. the water cycle and living systems e.g. biomes.

Figure 4-6 shows the relative frequency of fourteen teachers' explicit referencing of five dimensions of Wellbeing in their answers to this question. These five dimensions are drawn directly from Durie's Te Whare Tapa Wha (Durie, 2009), except that mental and emotional wellbeing are separated here since not all teachers mentioned these dimensions together.

Seven teachers didn't mention any of these dimensional terms, and four of these teachers belonged to the subgroup that limited Wellbeing to the 'Health of the Individual'. Among the fourteen teachers who did use one or more of the five wellbeing dimensional terms explicitly, most used two or more and half mentioned four or five showing that a multidimensional perspective on wellbeing was widespread in this group. In the theoretical development of the minimal SWM framework in Section 3.5.3, the Emotional/Feeling domain at the level of the individual was established as corresponding to the Social Justice domain of the Human Societal level. Interestingly, if the Social and Emotional dimensions are conceived of as intrinsically more related to one another than the other three dimensions, and treated as a single natural dimension of Wellbeing, the resulting four dimensions in Figure 4-6 are very nearly evenly distributed. However, while all five teachers who mentioned social wellbeing also mentioned emotional wellbeing, the three who mentioned emotional without social all

belonged to the ‘Health of the Individual’ subgroup. This observation corresponds with the relatively low priority accorded to the Social dimension of sustainability by participants shown in Figure 4-4.

*Figure 4-6 The Dimensions of Wellbeing showing the frequency with which each was mentioned. 14 Teachers are included with an average of 3.9 dimensions mentioned per teacher*




### 4.3.4 Sustainable Wellbeing

The teachers’ response to the question: What does the term 'Sustainable Wellbeing' mean to you?’ could be characterised using two ordinal dimensions. The ‘Included domains of Self’ dimension refers to whether a teacher described Wellbeing as simply ‘Health’ or ‘Doing well’, or gave a deeper more detailed account incorporating physical, mental, emotional and spiritual health, domains, including the idea of self-fulfilment or improvement. The ‘External System Scope’ dimension refers to how far beyond the individual a teacher’s idea of 'Sustainable Wellbeing extended to include society, humanity as a whole and the planetary biosphere. The way the twenty-two teachers’ interpretations of the phrase 'Sustainable Wellbeing' fitted into this two-dimensional scheme is displayed in Table 4-2. The names of the nine Core Participants—whose contributions to the study are the subject of Chapter 5—are highlighted in green.

The most striking feature of this table is its empty centre and the balanced polarity between the four top left (violet border) and the four bottom right cells (yellow border) of the table. The empty centre shows that no teacher was thinking of ‘Sustainable Wellbeing’ as referring primarily to the relationship between individual holistic wellbeing and their local community of social relationships, although that interpretation could be inferred as being included by the eight teachers in the lower right corner of the table(yellow border). The twelve teachers within the violet and yellow borders include six of the nine Core Participants, three in each group. The six teachers within the violet border, including three of the nine Core Participants, saw 'Sustainable Wellbeing' as being simply good health or “doing well” or as an absence of stress for individual teachers and in one case, for their students. Holly wrote “Looking after yourself in a way that can be maintained/is within your means” and Simon wrote:

> Being able to carry on with my teaching practice without being forced to engage in activities that are not helping in my role as a teacher and that deplete my energy reserves and will to recover. Educational practice that does not treat teachers and students as a resource to be exploited.

*Table 4-2 Characterising the 22 Phase 1 teachers' interpretations of the phrase 'Sustainable Wellbeing'. The highlighted names are the nine Core participant teachers.*

| **Included domains of Self** (by increasing depth of included domains of Self) | **External System Scope** —by increasing scope of the included external system—> | | | | | **Number of Teachers** |
|---|---|---|---|---|---|---|
| | **Individual** | **School** | **Society** | **Humanity** | **Biosphere** | |
| **Physical & Economic Health** | Brittany, Holly, Mathew, Tara | | Deb | | Amber, Philippa | 7 |
| **Occupational** | Claire | Simon | | | | 2 |
| **Mental, Emotional, & Physical Health** | Bronwyn | | | | Nicola | 2 |
| **Hauora; Te Whare Tapa Wha (incl. Social & Spiritual)** | Anita, Anthony, Stephanie | | | Daniel, Tracey | Bridget | 6 |
| **Holistic Self-Fulfilling** | Gemma | | Lucy | | Brent, Megan, Rebecca | 5 |
| **Number of Teachers** | 10 | 1 | 2 | 2 | 7 | 22 |

Almost half of the ten participants who interpreted 'Sustainable Wellbeing' as an attribute of individuals, including four of the Core Participants, seemed to be reading the phrase as a statement about enduring personal Wellbeing rather than ‘Sustainability’ in the global sense. Eight of these same teachers (excluding the Core Participants Anita and Claire) also defined ‘Sustainability’ in the first question either as just ‘Duration’ or just ‘Natural Resources Preservation’, although Stephanie also added: “It usually makes me think about environmental sustainability but I am aware that there are other types of sustainability such as cultural and financial”. While some of these teachers had a simple good health view of individual ‘Sustainable Wellbeing’, others had a holistic and aspirational understanding like Anita, who described it as "Managing all aspects (mental, physical, emotional and spiritual) of a person in a way which can be sustained in the longer term”, and Gemma who wrote, “a state of wellbeing that can be maintained indefinitely—the state of wellbeing influences further wellbeing”.

At the top right of Table 4-2, two teachers also interpreted 'Sustainable Wellbeing' as meaning global and environmental justice based purely on security without reference to any of the inner domains of the self. Philippa, for instance, defined it as “enduring environmental and human security" and Amber wrote:

> Where one person/group/nation's wellbeing doesn't mean that others lose out - it is a win/win not a win/lose scenario. The idea of sustainable wellbeing should encapsulate that all parties have the opportunity to do well, not just the ‘haves’. A

> fundamentally unfair society is a sick society (the same could be said for the environment!)

The teachers at the bottom right corner of the table (within the yellow border) saw 'Sustainable Wellbeing' as both multidimensional ‘hauora’ for the individual self, and as extending to include not only humanity in general but also all parts of the biosphere. Brent wrote:

> I understand this to be the idea of practices that build up yourself and those around you—spiritually, physically and mentally. Which can be sustained long-term and do not damage the environment or [only] use resources that can be replaced.

And Megan:

> An interesting and important question. Papa-tū-ā-nuku [the Earth Mother] and Rangi-nui [the Sky Father], our planet, is under stress trying to cope with the recent choices our species has made. If 'sustainable' means that the Earth's biosphere will be able to support future generations and 'wellbeing' is hauora, then 'Sustainable Wellbeing' means that Earth's biosphere and human society are co-existing in a way that is beneficial to all.

## 4.4 A Metacurriculum Structure

### 4.4.1 Section Overview

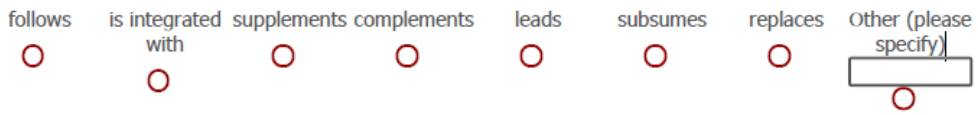
A key theoretical presumption of this study is that education for Sustainable Wellbeing cannot be adequately provided through a purely disciplinary worldview. Some proportion of the formal school timetable will have to be given over to a holistic systems understanding of the human condition. This will require transdisciplinary, cross-curricular courses that, ideally, all students take in some coherent relationship with traditional subject-based lessons that allow students specialist options.

In the third section of the first Delphi Survey, the participating teachers were presented with the following statement.

> The pros and cons of Interdisciplinary (cross-curricular), and Disciplinary (based on learning areas and subjects) curriculum designs and school timetable structures, have long been debated in education.

Four questions followed. The first asked teachers to:

> Select an option from the list below that for you, best fills the blank space in the following sentence:
>
> I believe Sustainable Wellbeing education could be best implemented with a framework that _____ curriculum design based on learning areas and subjects.




The second asked:

> What share of the weekly senior school timetable would you ideally like to see dedicated to cross-curricula Sustainable Wellbeing-directed learning as compared to specialised subject-directed learning?

Participants were given a scale from 0% to 100% (in 12.5% increments) with which to respond.

The third question asked teachers to:

> Add any comment on your choices for the two questions above

And the fourth asked:

> What does the word 'metacurriculum' mean or suggest to you?

In designing the survey instruments, the likely effect on participants' responses to the ordering of questions was carefully considered at every stage. This question could have been placed immediately following the question about the meaning of 'Sustainable Wellbeing'. In light of how I intended to use the term 'metacurriculum' and that it is not a commonly used word, I decided to place it after the cross-curricular and subject-based timetabling questions to provide some guidance about the scope of the expected responses; 'enabling constraints' in action.

No mention of team teaching for cross-curricular courses was made until the second Delphi survey round which was, with hindsight, a lost opportunity to understand teachers' responses to these structural questions.

### 4.4.2 Cross-Curricular and Subject-Based Timetables

There was very little consensus among the participants in their positions on the best pedagogical strategy for Sustainable Wellbeing education. In Table 4-3 I have shown how teachers responded to the first two questions. Again the Core Participants are highlighted in bright green. The other colours reflect the frequency of responses in each cell and the marginal totals with green low and red high. 'Integrates with' was the single most popular choice for the relationship between Sustainable Wellbeing education and Subject-Based Specialist lessons in the timetable with 41% of the twenty-two teachers preferring that descriptor. Half, however, chose descriptors that suggest a more important role for Cross-Curricular pedagogy. The mean Cross-Curricular timetable share was 39% based on 19 responses. The distribution of these responses, however, was distinctly bimodal—as can be seen in the right Grand Total column of the table—with a relatively high standard deviation of ±30%.

The order in which the descriptors were presented in the survey was intended to reflect an increasing emphasis on the potential role of Cross-Curricular pedagogy from left to right. There is some evidence in Table 4-3 that teachers interpreted the words 'Supplements', 'Complements', 'Subsumes', and 'Replaces' in that way but the spread of percentages especially for the phrase 'integrates with', suggests that teachers are interpreting this phrase and words like 'leads' and the phrase 'Cross-Curricular' itself, in diverse ways meaning these terms would require far more precise definitions to be of any practical use in an actual Sustainable Wellbeing curriculum implementation. The extent and nature of this diversity become more apparent during the Core Participant interviews which are the subject of Section 5.3.

*Table 4-3 The Number of teachers by Cross-curricular share of the year 11-13 timetable and the relationship between Sustainable Wellbeing education and Subject-Based lessons in the curriculum.*

| | **Sustainable Wellbeing education could be best implemented with a framework that _____ curriculum design based on learning areas and subjects.** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Cross-Curricular Timetable share%** | **Follows** | **Integrates With** | **Supplements** | **Complements** | **Leads** | **Subsumes** | **Replaces** | **Grand Total** |
| 100% | | | | | | | Lucy | **1** |
| 87.5% | | | | | | | Nicola | **1** |
| 75% | | | | | Tara | | | **1** |
| 62.5% | Brittany | | | | | Anthony | | **2** |
| 50% | | Brent | | Rebecca | Daniel | | | **3** |
| 37.5% | | Bridget<br>Deb | Tracey | Anita | | | | **4** |
| 25% | | Mathew | | | | | | **1** |
| 12.5% | | Holly | | Claire<br>Simon | | | | **3** |
| 0% | | Gemma<br>Stephanie | | | Megan | | | **3** |
| (blank) | | Bronwyn<br>Philippa | | | Amber | | | **3** |
| **Grand Total** | **1** | **9** | **1** | **4** | **4** | **1** | **2** | **22** |

Six of the nine teachers who opted for the 'integrates with' descriptor interpreted it as meaning that Sustainable Wellbeing would be integrated into subject-based lessons as an important context for disciplinary knowledge, skills and priorities. Mathew, Bridget and Brent however included the possibility of 'integrates with' meaning separate cross-curricular lessons that prioritise Sustainable Wellbeing themes and issues into which relevant threads of diverse disciplines could be integrated as required. These nine teachers, and possibly all 22, also interpreted the Cross-Curricular Timetable Share question in two distinct ways. Bronwyn, Gemma, Stephanie, and Philippa saw this as applying to separate cross-curricular lessons that prioritise Sustainable Wellbeing themes and issues—as I had intended—and chose 0.0% because they saw the integration of Sustainable Wellbeing into subject-based lessons as the best approach. The other six teachers seemed to interpret the Cross-Curricular Timetable Share as the time that they would devote to Cross-Curricular Sustainable Wellbeing themes within their subject-based lessons or overall. Again, in hindsight, I see that this ambiguity could have been avoided with one or two additional questions in this section of the survey. However, all but four of the teachers helpfully clarified their interpretations of the descriptor and the Timetable Share questions themselves in their explanatory comments.

Bronwyn for instance did not respond to the Cross-Curricular Timetable Share question at all commenting, “If it was integrated into subjects the question above becomes irrelevant.” Gemma and Stephanie also opted for no dedicated cross-curricular lessons. Gemma emphasised the importance, of success in NCEA for students’ wellbeing and motivation and noted the effect of the COVID-19 pandemic lockdowns in 2021 on her contact time with students:

> [For] Year 11 to 13 sitting NCEA, wellbeing in students is already impacted by lack of time in class—so more time out would be counterproductive. Integrated means the pedagogy would sit within an Achievement Standard—rewarding students extrinsically with credits to motivate

Stephanie, Mathew and Claire (who opted for the ‘complements’ descriptor) also cited the overcrowded curriculum as the reason for their timetable preferences. Stephanie, however, imagines that other solutions may be possible at least in principle. She wrote:

> Timetables are very crowded already with a multitude of demands so integrating sustainable wellbeing across curriculum areas would possibly be the most effective approach unless the way education is delivered is completely changed.

Holly and Claire both opted for a 12.5% Cross Curricular Timetable Share and both saw that time as being integrated within the context of their subject-based lesson. Holly wrote:

> This allows for flexibility by different schools and teachers. Sustainability and wellbeing can be integrated in a number of different ways, that are meaningful and add to the curriculum-based learning areas.

Deb who opted for a 37.5% Cross Curricular Timetable Share also assumed this was within subject-based lessons while Mathew, Bridget and Brent who opted for 25%, 37.5% and 50% Cross Curricular Timetable Shares respectively all assumed that would be partly or wholly allocated to separate cross-curricular lessons that prioritise Sustainable Wellbeing themes and issues. Bridget proposed a timetabling strategy that Brent also suggested at a later stage of the study. She wrote:

> To initiate it in secondary schools it could work with 2 lines ie 8 classes a week, similar to how Sports in Education approach the timetable. Once it gains in popularity as a valid subject option for students to choose, it could then be rolled out to more lines.

Brent commented on the increasing difficulty of integrating cross-curricular pedagogy and disciplinary content with increasing year levels in high schools. Tracey was the only teacher to select ‘supplements’ as the best descriptor for the relationship between Sustainable Wellbeing education and subject-based lessons. Like Bridget, she chose a 37.5% Cross Curricular Timetable Share and her attitude was similarly supportive. She wrote:

> I know that the way that education is heading, things are going to change. There will be much more project-based learning and less subjects being taught in their own silos. I think that this is exciting and when everyone is used to the new 'normal' it will be awesome.

The four teachers who selected ‘Leads’ as the right role for Sustainable Wellbeing education relative to learning areas and subjects, interpreted this descriptor in the same sharply contrasting ways as

those that chose ‘integrates with’. Amber and Megan, like Gemma and Stephanie, selected 0.0% Cross Curricular Timetable Share with the same reasoning. Megan explained:

> If Sustainable Wellbeing Education leads the development of curriculum then it will be taught/experienced by all students in all subjects and would not require a specific allocated teaching slot.

Daniel and Tara, however—who opted for 50% and 75% Cross Curricular Timetable Shares respectively—had altogether different interpretations of how Sustainable Wellbeing Education would ‘Lead’. Both favoured separate cross-curricular lessons but also saw an important role for subject-based specialist lessons. Their perspectives are explored further in Chapter 5 through their interviews.

Representing the polar opposite view to the subject-based-only approach to Sustainable Wellbeing Education were three teachers who thought that Sustainable Wellbeing education could be best implemented with a framework that ‘subsumes’ or ‘replaces’ curriculum based on learning areas and subjects. Anthony selected a 62.5% Cross Curricular Timetable Share only because he was reserving some purely subject-based lesson time for the Health learning area. He explained his position as follows:

> I feel that the focus of education programs needs to first be on improving or maintaining high levels of well-being for students before it focuses on specialised curriculum or content delivery. Any student who has low levels of well-being including any physical, mental-emotional, social, or spiritual distress is not able to learn content effectively so it is a misguided focus. I also believe that if students are able to co-construct and have some power and say over their own learning (cross-curricula) this will have positive impacts on their well-being and therefore engagement and success (as defined by them, not norm-referenced criteria). This is why I believe there should be at least 60% of time dedicated to this and the only reason I didn't go higher was because I believe there should be time solely dedicated to improvement and maintenance of well-being i.e. well-being is the curriculum.

Nicola chose an 87.5% Cross-Curricular Timetable Share because “Current knowledge and skills can be integrated into project-based learning in real-life contexts to engage students and build their thinking and problem-solving skills”. Lucy was the one teacher who opted for a 100% Cross Curricular Timetable Share, and she explained:

> The world we live in is not divided into subjects, all subjects ebb and flow throughout our daily lives on a regular, unscheduled basis. Often, one will lead into another, naturally. It is my belief that students will respond and engage in learning when they are learning in an authentic environment.

Lastly, there was a group of four teachers who adopted a more cautious or ambivalent attitude toward the questions of optimum timetabling strategies for Sustainable Wellbeing education. Brittany thought that it should follow subject-based specialist lessons but chose a Cross-Curricular Timetable Share of 62.5%. Anita and Rebecca—who as we will see in Section 6.4 were the Core-Participant teachers that have made the greatest progress already toward Sustainable Wellbeing education in their schools—described the timetable relationship with subject-based pedagogy as ‘complementary’, and selected 37.5% and 50% Cross Curricular Timetable Shares respectively. Anita wrote, “I am not

sure what sustainable wellbeing education could become, so I am hedging my bets until I find out more about it." Rebecca didn't explain her choices. Simon also opted for the 'complementary' descriptor but a Cross-Curricular Timetable Share of only 12.5%. He explained:

> The issue with cross-curricular/curriculum integration pedagogy is that it is very effective in maintaining student engagement but is unproven in its ability to advance academic achievement in the long term. The determination to have curriculum integration become established as a dominant practice will damage students' ability to engage in demanding professional training where content knowledge is required. The effect of this practice on teacher health and staff turnover is still under investigation but the reports I have looked at are that it is very demanding on practitioners.

Perhaps not surprisingly, Simon did not remain in the study beyond the first Delphi survey. His appraisal of cross-curricula sustainable wellbeing education is nevertheless likely to be representative of an important and not insignificant proportion of Aotearoa New Zealand's secondary school teachers, which any proposal for a Sustainable Wellbeing Metacurriculum will need to convince of its merits. Contrary to Simon's suspicion that there is a strong political will for curriculum integration to become "established as a dominant practice", based on the sample of pro-Sustainable-Wellbeing teachers in this study, the mean preferred Cross Curricular Timetable Share was less than 50%. The study Core Participants group largely occupies the centre ground in Table 4-3 and their mean Cross Curricular Timetable Share was 47% with a standard deviation of just 23%. This finding contrasts with their more diverse interpretations of what 'Sustainable-Wellbeing' means for the 22 phase 1 study participants, shown in Table 4-2.

### 4.4.3 The meaning of 'Metacurriculum'

In this study, I have suggested that a 'metacurriculum for sustainable wellbeing' is in part a curriculum about curriculum—a curriculum that not only critically investigates all aspects of existing, business-as-usual normative curricula, from the standpoint of sustainable wellbeing but also sets about transforming those curricula with a transdisciplinary, transphenomenal, and interdiscursive, self-organizing, self-aware intent.

To gain an understanding of how closely this interpretation resembled the way teachers might read this relatively unfamiliar term, the last question in the third section of the first Delphi Survey asked: What does the word 'metacurriculum' mean or suggest to you?

Three teachers conceded that they were unsure what the word might mean but made some insightful guesses. Only two offered suggestions that had little connection to my original intent. The other 20 teachers provided a range of meanings that either aligned well with the interpretation I had earlier arrived at or suggested useful new shades of meaning. Twelve provided two or more possible meanings. I have organised these suggestions in Table 4-4 into three major themes and ten subthemes which are shown in descending order by the frequency with which each was mentioned by different teachers.

*Table 4-4 The possible meanings of the word 'metacurriculum' showing the number of times each was mentioned by a different teacher.*

| | Number of mentions | | |
|---|---|---|---|
| **Originally Anticipated Meanings** | **27** | | |
| **Pandisciplinary** | | 19 | |
| Cross-curricula, transdisciplinary, and connecting | | | 7 |
| Overarching or Big curriculum | | | 7 |
| A curriculum about curricula; identifying further knowledge needed to solve complex problems | | | 2 |
| Big ideas and disciplinary learning combined | | | 2 |
| Centred on one objective | | | 1 |
| **Meta-Cognition** | | 8 | |
| Developing independent higher-order thinking, learning, and problem-solving | | | 7 |
| Instilling a growth mindset | | | 1 |
| **New Shades of Meaning** | **3** | | |
| **Learning for Life** | | 3 | |
| A variety of different learning experiences | | | 1 |
| Learning for All of Life | | | 1 |
| Hidden Curriculum | | | 1 |

The first major theme 'Pandisciplinary', groups ideas about metacurriculum that emphasise its unification of knowledge, inclusion of all disciplines, and its organisation around one central principle. Typical of those who described a metacurriculum as 'Cross-curricula, transdisciplinary, and connecting' were Bronwyn, who wrote "An overall curriculum—not broken into parts", and Simon who wrote, "A curriculum that expands across typical curriculum areas and attempts to integrate learning from several disciplines at once." Under the subtheme 'Overarching or Big curriculum' are included Anita's suggestion "A framework which sits above the curriculum?" and Gemma's "overarching ideas such as values, competencies—that are designed to be integrated into all areas".

'Pandisciplinary' captures the essence of the provisional explanation of the term 'metacurriculum' that I provided as a unifying point of reference for participants in the following section of the round 1 survey. It read:

> In my research I take the term 'metacurriculum' to mean; some coherent construction of Interdisciplinary and Disciplinary education that connects all elements to a central organising ideal.

In the same way that metacognition means thinking about one's own thinking, metacurriculum also has a self-referential meaning. Holly was the only teacher to use the phrase "a curriculum about curricula" but Nicola effectively described how that meaning could be realised with students. She wrote:

> If students are explicitly taught thinking skills they can become more agentic. They will then be able to identify what further knowledge they need to address any problems they need to solve and become independent learners and thinkers able to solve complex problems independently and collaboratively.

The possibility that students, particularly senior students, can be involved with teachers in the ongoing evolution of a metacurriculum for Sustainable Wellbeing, emerged from this study as the strongest single factor characteristic of the schools which had made the most progress towards the ideal of an SWM, as I describe in Section 6.4.3 and show in Table 6-14.

Closely related to metacurriculum as a curriculum about curricula are the metacognitive interpretations of metacurriculum. Brittany suggested "Higher order thinking". Lucy wrote:

> Metacurriculum suggests to me, the hidden parts of the curriculum. To me, they are the most important parts, which, I believe we should be teaching explicitly. We should be teaching students HOW to think, not WHAT to think.
> [Emphasis in the original.]

Rebecca also emphasised thinking skills over content and the wellbeing aspect of nurturing students' self-belief through a growth mindset.

> Metacurriculum, to me, is associated with thinking and problem-solving. Being able to think deeply and make decisions independently gives students confidence across curriculum areas and allows them to flourish. In a Visual Art context, we discuss growth mindset with students and talk about instilling the concept of growing skills and ability through effort and that the ability to draw does not rely on some magical talent!

Extending this relationship of metacurriculum with student wellbeing were three suggestions that could be characterised as meaning 'Learning for Life', which go beyond the originally proposed definition. Bridget's comment exemplified this interpretation which includes everyday contexts. She described a metacurriculum as;

> integrating life skills into the learning rather than being a credit-focused approach. To be ongoing so the skills and learning continues outside the classroom, school and into the community.

## 4.5 An Emerging Framework

### 4.5.1 Section Overview

The co-construction and evolution of the SWM framework—which remains ongoing—followed a process of distinct steps through the three phases of this study as presented in Table 4-1. In this section, the first six steps of the process are reviewed—up to the completion of the second Delphi Survey round analysis and before the interviews of phase 3, as shown in Table 4-5.

*Table 4-5 First steps in the co-construction and evolution of the SWM framework*

| Phase | Step | | Date |
|---|---|---|---|
| 1 | 1.1 | Delphi Survey #1 opened and basic SWM framework concepts introduced | 11 March 2021 |
| | 1.2 | Delphi Survey #1 closed | 19 April 2021 |
| | 1.3 | All participants were sent the documents 'SWM1 Summary for Panellists' and 'SWM2 Preview for Panellists' | 5 August 2021 |
| | 1.4 | All participants were sent the link to open Delphi Survey #2 | 8 August 2021 |
| 2 | 2.1 | Delphi Survey #2 closed | 27 August 2021 |
| | 2.2 | 14 participants sent 'SWM Delphi round 2 Report for panellists' with a covering email requesting offers of semi-structured interviews in advance of Delphi Survey #3 | 1 November 2021 |

### 4.5.2 Introducing the SWM Framework Domains

Sections 4 and 5 of the first Delphi Survey round invited the panellists to suggest the curriculum content they considered most important for a metacurriculum centred on Sustainable Wellbeing within the initial minimal framework of two levels and three corresponding domains at each level. The survey text is shown in full in Appendix B-1. Following my formal definition of the term 'metacurriculum', the survey introduced the theoretically derived minimal framework for an SWM with brief descriptors for each of the domains of the Human-Societal level and the request for suggestions of Knowledge, Issues, and Big Ideas within these domains that would be most important to include in a Sustainable Wellbeing Metacurriculum for years 11 to 13 students. Then, in section 5 of the survey, the domains for the Individual-Interpersonal level were introduced with the request for suggestions of Skills, Competencies, and Dispositions within these domains that are most important for years 11 to 13 students to develop in a Sustainable Wellbeing Metacurriculum.

Table 4-6 summarises the two levels and six domains of the minimal framework for the SWM as presented to the participating teachers in the first Delphi Survey round. The colour coding of the domains shows the domain correspondences implied between the two levels but the theoretical underlying fractal subdomain structure—as shown in Table 3-2—which was still hypothetical at this stage—was not presented to participants. Some of the domain names were later modified as an outcome of the co-construction process, 'Global Justice' for instance as already mentioned, later became 'Social Justice', 'Affect' became 'Feeling', and 'Cognition' became 'Thinking', in response to feedback about student-friendly language. The 'Individual-Interpersonal' level also became two separate 'orientations' with corresponding domains as will be explored further in the next section. While the teachers were asked explicitly for suggestions concerning the central 'domain' of the 'Integrating Self'—which "organises Hands, Heart, and Head as a coherent whole", there was no opportunity given to make suggestions concerning the corresponding 'domain'—'Sustainable Wellbeing'—at the 'Human-Societal' level which is why I have shown this domain and its descriptor in brackets in Table 4-6. The idea that 'Sustainable Wellbeing' and the 'Integrating Self' are strange attractors in complexity theoretical terms, that have the potential to coordinate the self-organisation of the 'Ecosphere, Social Justice, and Cultural Vision' for society and 'Action, Feeling, and Thinking' in the individual respectively as coherent totalities, was still implicit for me at this stage and participants had already been asked for their views on what Sustainability and Wellbeing are. When I later asked

Nicola in her interview what she thought of the domain and subdomain names that had emerged from the first two Delphi rounds she observed:

> … maybe it's just because I haven't looked at it in enough detail. But there isn't really anything that is a sort of [an] intro unit. And maybe that's just because everybody would do their own thing. But in terms of what is sustainability? And, you know, what will this course deliver for students?

Again with hindsight, this was perhaps another lost opportunity. In principle, there is no reason the design of an SWM unit, as illustrated in Figure 3-1 and Figure 3-2, could not start and end with the central Sustainable Wellbeing triangle itself, but this was not made clear to participants.

*Table 4-6 The proposed starting structure for an SWM framework as presented to the Delphi participants in round 1*

| Level | Domain | |
|---|---|---|
| | | **[Knowledge, Issues, and Big Ideas]** |
| (Sustainable Wellbeing) | | (organises Ecosphere, Social Justice, and Cultural Vision as a coherent whole) |
| Human and Societal | Ecosphere | refers to humanity's relationship with its planetary, ecological, and built environment |
| | Social Justice | refers to humanity's world of social, political, and community relationships. |
| | Cultural Vision | refers to humanity's relationship with its cultural histories, its present, and its future |
| | | **[Skills, Competencies, and Dispositions]** |
| Integrating-Self | | organises Hands, Heart, and Head as a coherent whole |
| Individual and Interpersonal | Action-Hands | refers to the Individual's physical relationships with their natural and built environment, other people, and their own body |
| | Affect-Heart | refers to the Individual's emotional relationships with nature, others, and self |
| | Cognition-Head | refers to the Individual's sense perception-thought, relationships with nature, others, and self |

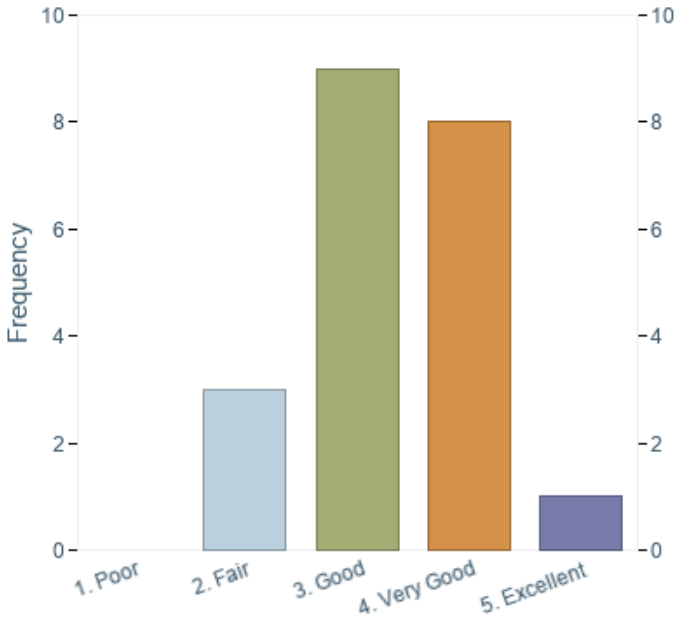
## 4.5.3 First Iteration

### *4.5.3.1 Teacher Evaluations of the Basic SWM Framework*

The minimal SWM framework was affirmed by a substantial majority of the teachers in round 1 of the Delphi survey. At the end of Section 4—which dealt with the Human and Societal level of the SWM framework—panellists were asked to: Rate the usefulness of this three-domain Framework for thinking about Sustainable Wellbeing Education. A five-point Likert scale was provided and the frequency of panellists opting for each point is shown in Figure 4-7. Twenty-one panellists responded to this question. Their mean rating was 3.3 indicating a clear majority evaluation of 'Good' and nearly

'Very Good', the boundary between 'Good' and 'Very Good' taken to be at 3.5. The sample standard deviation of this relatively normal distribution was 0.796. A standard deviation of less than 1.0 for a five-point Likert scale distribution (i.e. 20% of the full range of possible scores), has been accepted in similar studies as representing a high degree of consensus (Osborne et al., 2003).

*Figure 4-7 Teachers' ratings of the usefulness of the three-domain framework for a Sustainable Wellbeing Metacurriculum at the Human and Societal level. n=21*




Section 5 of the Delphi round 1 survey dealt with the Individual and Interpersonal level of the SWM framework. At the end of this section, panellists were asked the same rating question about this four-domain structure. The average rating for this level of the SWM was more positive than that for the evaluation of the human and societal level domains. However, the degree of consensus here is slightly less. The distribution of responses is shown in Figure 4-8. Eighteen panellists responded to this question. Their mean rating was 3.56. The median and modal ratings were both 4 indicating a clear majority evaluation of 'Very Good'. The sample standard deviation of this negatively skewed but reasonably normal distribution was 0.92 framework which represents a satisfactory degree of consensus.

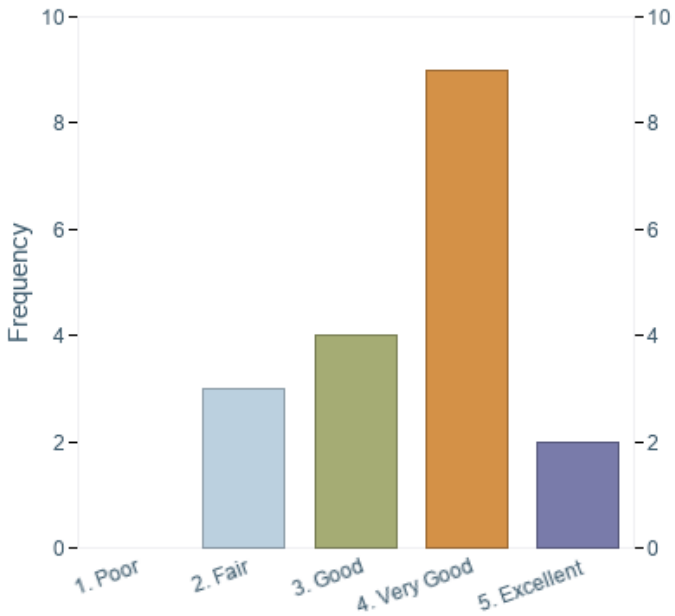
Only one teacher, Brent, challenged the minimal framework choice of domains for Sustainable Wellbeing, as already noted in Section 3.7. In response to a later question in the round 1 survey he wrote:

> Like all changes, we would require a very strong 'why'. Why these domains, why these capabilities?

Brent—who is one of the Core Participants—rated the usefulness of the three-domain framework at the Human and Societal level as only “Fair” but gave the Individual and interpersonal level domains a “Good” rating.

Participants' comments on this level of the framework were positive but also highlighted some of the major challenges that would be involved in its continued elaboration. Nicola wrote: “I like this framework. How the different domains integrate with and reinforce each other to promote personal development and agent behaviour will be interesting”. Daniel pointed out the difficulty in assigning specific Skills, Competencies, and Dispositions to the domains of Action, Feeling and Thinking when so many desirable character traits for Sustainable Wellbeing involve all three to varying degrees saying, “Like all domains, it can be tricky to see what is logical to be put where e.g spiritual/religious practices, with some having large overlap.” Brent noted the assessment challenge for these domains writing, “It is useful as it is outcomes focused. The challenge is how to evaluate [the] development of capabilities”.

*Figure 4-8 Teachers’ ratings of the usefulness of the four-domain framework for a Sustainable Wellbeing Metacurriculum at the Individual and interpersonal Relationships level. n=18*




Perhaps the biggest challenge for bringing these domains into the realm of explicit pedagogy would be for teachers’ professional development and learning. As Holly observed:

> If you are doing this in a secondary school, finding a teacher who has the skills to deliver this genuinely, will be very difficult. Especially if you are envisioning a progression from L1 - L3. There is a lot going on here.

In Section 5.5.2, I return to consider other comments from teachers who gave the ‘Fair’ ratings for the framework domains in Delphi round 1, in a wider presentation of the progression of participant evaluations of the framework as it emerged through all three phases of the study.

### *4.5.3.2 The Delphi Round 1 analysis*

*Human-Societal Level*

The analysis of teachers' suggestions of Knowledge, Issues, and Big Ideas within each of the Sustainable Wellbeing domains—Ecosphere, Social Justice, and Cultural Vision—led to a framework of nine subdomains that aligns well with the anticipated fractal self-similar theoretical framework introduced in Table 3-2, and began to reveal the unique nature of each subdomain. The first iteration of subdomain titles arose from the realisation that teachers' suggestions could be organised according to the ways human action, feeling and thought manifest in each domain and an underlying dimensionality in the domains on which I elaborate in Section 7.2.4. The nine subdomain titles are shown in Table 4-7 along with the three 'Outcome Goal Descriptors' for each subdomain that arose out of teachers' suggestions of Knowledge, Issues, and Big Ideas.

Each subdomain has the two-letter code and colour coding—as introduced in Table 3-2—that represents the self-similar fractal structure of the framework. The first letter represents its primary domain and the second letter, the secondary fractal domain. Thus, for instance, 'Maker-Recyclers' is EE since the Ecosphere is both its primary and secondary domains. 'Power and Influence' is SC, since Social Justice is its primary domain and 'Cultural Vision' is its secondary domain.

The right-hand column of Table 4-7 shows the total number of references within the teachers' suggestions that were assigned to each subdomain. The numbers shown for the domains themselves refer to suggestions that could not be easily assigned to any one of its subdomains. Most references were given as single words or short phrases but some involved extended statements and explanations. The range of suggestions demonstrates that a metacurriculum for Sustainable Wellbeing necessarily involves ongoing discussion about what 'Sustainability' and 'Wellbeing' mean in each domain. Well represented in the Ecosphere domain, was the fundamental tension between Economic and Ecological Wellbeing, between the priorities of specialist disciplinary silos and holistic knowledge systems. Simon's suggestion for key knowledge in this domain was:

> Economics. That technology is used to solve individuals' problems for profit. If there is no profit there is no problem-solving. Individuals typically need to specialize to develop the skills and knowledge needed to address the world's problems. Generic knowledge is not sufficient. The world is getting better, in 1900 90% of the world's population lived below the subsistence/poverty line, in 2019 that had reduced to 10%. This is due to industrialization, technology, and global trade.

These assertions provide plenty of grounds for informed debate with the position taken by the rest of the panel, typified by Deb's suggestion: "To know how to care for our planet and what the implications are for not doing our bit.". Exemplifying the 'Maker-Recyclers' subdomain type knowledge were the suggestions 'Recycling', 'plastics and pollution', and 'renewable energy'. Claire wrote:

> The majority of our work in class is done digitally, so I think it would be important for the students to understand the impact of the use of their devices - where they come from, the power usage, how to dispose of them.

*Table 4-7 The First Iteration of SWM Human and Societal Level, domain, subdomain Titles, and 'Outcome Goal Descriptors' from Teachers' Suggestions of Knowledge, Issues, and Big Ideas that would be most important to include in a Sustainable Wellbeing Metacurriculum*

| Domain | | Subdomain | Outcome Goal Descriptors | No. refs |
|---|---|---|---|---|
| **Ecosphere** | **E** | | **Humanity's relationship with its planetary, ecological, and built environment** | 12 |
| | EE | Maker Recyclers | Achieve Planet Cyclic Manufacturing and Zero-waste technologies.<br>Explore high and low-tech renewable energy solutions.<br>Develop Eco-housing/cities, Eco-transport, and Eco-communication infrastructure | 12 |
| | ES | Regenerative Cultivators | Regenerate abundant, cultivated, and managed Ecosystems: Fisheries, Agriculture, Horticulture, Forestry, etc.<br>Understand our interdependent place in the inter-species web of life.<br>Develop hands-on low-tech cultivation and eco-friendly high-tech sustainable resource management skills. | 14 |
| | EC | Kaitiaki Hunter-Gatherers | Explore our relationship to undomesticated ecosystems and planetary processes.<br>Reverse Biodiversity loss and rewild local ecosystems for planetary wellbeing.<br>Understand, mitigate and adapt to Climate Change. | 23 |
| **Social Justice** | **S** | | **Humanity's world of social, political, and community relationships.** | 4 |
| | SE | Whanau and Community | Overcome malnutrition, poor wellbeing, social isolation and exploitation.<br>Develop manaakitanga, community service,<br>Know what respectful interpersonal relationships look like, both physical and on social media. | 14 |
| | SS | Rights and Responsibilities | Assert rights and accept responsibilities.<br>Eliminate poverty and Injustice with greater equity, mediation, and good governance.<br>Ensure empowering, fair and fact-checked media. | 19 |
| | SC | Power and Influence | Understand political and financial systems including activism and lobbying.<br>Contribute to an ecologically realistic, equitable global direction in corporate, political, and social welfare systems.<br>Practice leadership and collaboration. | 14 |
| **Cultural Vision** | **C** | | **Humanity's relationship with its cultural histories, its present, and its future** | 2 |
| | CE | Our Cultural Inheritance | Understand whakapapa, our warrior history and inherited taonga.<br>Appreciate the benefits and costs of trade and technology.<br>Critique and correct our errors, unconscious judgements, and premises, including those of established disciplines. | 17 |
| | CS | Others' Cultures and World Views | Actualise the potential gains from multiculturalism and overcome its vulnerabilities.<br>Appreciate the otherness of our perspective from the others' viewpoints.<br>Understand the interconnectedness of ethnicities, religions, nations, and social movements. | 17 |
| | CC | Cultural Evolution and Individual Agency | Imagine and Innovate for a biospherically conscious world culture.<br>Consider Individualism vs. collectivism and the nature of free will in an AI-assisted world of surveillance and consumer prediction.<br>Navigate identity cultures (e.g. LGBTQ+, urban vs rural, generational, etc.) | 10 |

Relevant to the 'Regenerative Cultivators' subdomain, were phrases like 'Sustainable/environmental food production', and 'Clean waterways'. Anita suggested, "Case studies of local ecosystems being impacted negatively and/or positively by humans" and Rebecca, "What are ways to meet United Nations' Goal 15: Protect and restore life on land, including ecosystems and forests?" Apropos the 'Kaitiaki Hunter-Gatherers' subdomain Bronwyn wrote: "How to combat climate change, [and] reduce our environmental impact on the planet." References to 'Global Warming', 'Biodiversity, Biomes, Habitat Loss', and 'Nature Connection' were also assigned to this subdomain.

In the Social Justice domain, teachers wrote about the social and anti-social polarities in Human behaviour and how they contribute to or undermine Sustainable Wellbeing, mentioning values such as 'gratitude', 'empathy', and 'social justice'. Deb suggested that teachers discuss with students, "How to remove ourselves from devices and become social beings again". Relevant to the Interpersonal and small group subdomain of 'Whanau and Community', were references to 'Manaakitanga-hospitality and looking after each other', and 'meeting United Nations' Goal 2: Zero Hunger'. Claire wants her students:

> … to see their lives outside of school and how community, is directly related to the social world and then in a sense the political world. Right now, they see school and their social lives as the be-all and end-all. But they don't realise that the school they attend is directly integrated into the community and that the skills they learn in the classroom are designed to help them be better citizens and contribute to the community in a positive way. But then they also need to see the bad side of community and social relationships. How it goes wrong, in what ways and what we can do about it. How we can help others.

Related to the 'Rights and Responsibilities' subdomain were, 'Justice systems around the world', Social responsibility', and 'Equality of race and gender'. Simon suggested that:

> Justice is earned in lives. It has to be paid for the hard way and we are constantly at risk of losing it. Wellbeing is not a right, it is a contested state. What you consider to be your rights may come at a cost to someone else, ie home ownership, freedom of travel, [or] the right not to vaccinate.

Typical of the 'Power and Influence' subdomain, Brent wanted students to understand "Political agendas- who drives them and why? How they gain and maintain power ... The influence of money and business on communities". Other suggestions assigned to this subdomain were 'Different government systems and agendas', and 'The influence of money and business on communities'.

Time is the dimension underlying the Cultural Vision domain, and its subdomains emphasise past, present and future respectively. The subdomain of 'Our Cultural Inheritance' deals with understanding the origins of the strengths and weaknesses of the culture into which we as individuals were born, in light of their past attainment, or not, of Sustainable Wellbeing. Simon expressed this as follows:

> Cultures attract baggage. All cultures have important knowledge that enriches the lives of their citizens and of the world, but all cultures have baggage that they would rather forget and at any stage, they are capable of repeating. All cultures have descended into chaos and violence when it has suited them. Civilisation is a very thin veneer.

Other suggestions relevant to this subdomain included 'Colonisation and decolonisation', and 'How dominant cultures influence history.' The subdomain of 'Others' Cultures and World Views', deals with our contemporary Cultural environment, fields like 'World cultures—the study of and understanding behind', and 'Indigenous perspectives'. Claire argued for the importance of this multicultural perspective:

> I understand the importance of our own history and I believe that it should come first, but I don't want to send students into the world with a very limited understanding of the history of other countries, especially if we want them to travel or work with members of the community. New Zealand is heavily multicultural so shouldn't we learn about all cultures and histories?

Finally, the subdomain of 'Cultural Evolution and Individual Agency' is concerned with the potential impact of individual leadership and imagination on future progress toward greater Sustainable Wellbeing, issues and questions like 'Individualism vs. collectivism', 'free will', 'Identity', and 'Where to now?'. The scope of this subdomain bridges individual and collective futures and their entanglement. As Amy writes: "'Cultural' needs to not just be along ethnic lines - but more also about identities as cultures (anything from LGBTQ+, urban vs rural culture, to generational cultures)", and Rebecca asks: "What are ways to meet United Nations Goal 11: Sustainable Cities and Communities?"

*The Individual-Interpersonal Relationships Level*

The request for suggestions of Skills, Competencies, and Dispositions within the domains of Action, Feeling, Thinking, and Self-Integration, assumed that these suggestions would be analysed within one structural level of the SWM framework, as shown in Table 4-6. Teachers' responses to these questions, however, fell naturally into two distinct, albeit intimately interrelated orientation: the 'intrapersonal' and the 'Interpersonal'. Further, the central Supra-domain of Self-Integration proved to be critical to teachers' understanding of what developing the capacity for Sustainable Wellbeing means for students as individuals. Table 4-8 shows the various ways teachers responded to the question, "What does the term 'Integrating-Self' mean to you?" Five themes were apparent with the most frequently mentioned being characterised as 'Te Whare Tapa Wha[3], Individual wellbeing and self-awareness'.

*Table 4-8 Themes identified for meanings of the 'Integrating-Self' sorted by the number of references contributing to each theme*

| Theme | Number of references |
|---|---|
| Te Whare Tapa Wha, Individual wellbeing and self-awareness | 9 |
| Self as the socially adept and well-integrated being | 4 |
| Systems thinking and action for positive change | 3 |
| Inner-self connected practice | 1 |
| Self as an environmentally aware being | 1 |

Table 4-9 shows the nine subdomains of the 'Integrating Self' that emerged from participants' suggestions of desirable character traits for students to develop within this domain. In Appendix B-2 I have included an extended version of this table, Table B-1, along with two tables that show the

[3] For an explanation of 'Te Whare Tapa Wha' refer to Section 2.4.7.2 Hauora and Wairua

corresponding subdomains at the Intrapersonal and Interpersonal levels for the domains of Action, Feeling and Thinking, Table B-2 and Table B-3.

At this point in the study, I decided that although further refinement of the Interpersonal and Intrapersonal 'Competency' orientations of the framework would be necessary for a full conception of the SWM framework, it was beyond the scope of this PhD project. The analysis of teachers' suggestions of desirable SWM Skills, Competencies, and Dispositions confirmed the versatility of the proposed fractal four-domain framework, but it became clear that a modified Delphi research design such as I was using was not ideal for effectively exploring the SWM Interpersonal-Intrapersonal level of the Integrating-Self. Nor was that exploration essential to answering my research questions. Nevertheless, I did include these subdomains of the Interpersonal-Intrapersonal level in the third Delphi Survey round for completeness and because they had been so favourably evaluated by participants in the first Delphi survey round. Three teachers, Tara, Deb, and Daniel made use of them in their SWM Unit planning, as shown in Table 5-11.

*Table 4-9 The nine subdomains identified for the 'Integrating Self' domain describing the skills, competencies, and dispositions to be developed in each, showing the number of panellist suggestions contributing to each*

| Levels | The 'Integrating Self' subdomains | Descriptors | No. references |
|---|---|---|---|
| **Total Self** | | | **1** |
| | **Integrating the inner, social and environmental Self** | Developing the ability to see yourself as a whole person interacting with the whole world around you | 1 |
| **Intrapersonal Self Integration subdomains** | | | **15** |
| 1 | **Self-directed learning** | Developing the ability to determine one's direction on the path of learning | 3 |
| 2 | **Self-Awareness** | Developing the ability to reflect on your sustainable living and wellbeing | 3 |
| 3 | **Self-regulation** | Developing self-discipline, good judgement and taking responsibility for yourself | 3 |
| 4 | **Self-Assurance** | Developing agency and confidence in your abilities | 3 |
| 5 | **Adaptability** | Developing flexibility and responsiveness in action, feeling, thinking and relationships | 3 |
| **Interpersonal Taha whanau Self Integration subdomains** | | | **9** |
| 1 | **Developing a wider view of self** | Developing and encouraging others to a wider view of life and Self | 6 |
| 2 | **Confidence in collaboration and communication** | Developing confidence in all domains of collaboration and communication to participate positively in your community | 2 |
| 3 | **Leadership skills** | Developing abilities to make significant contributions to the sustainable wellbeing of your community and humankind | 1 |

#### *4.5.3.3 Preparing Teachers for Delphi Round 2*

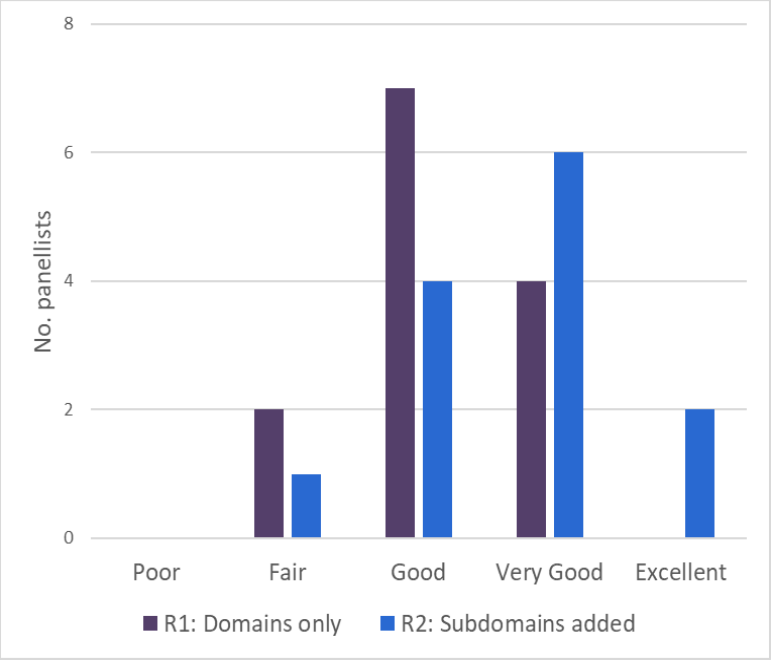
Fifteen weeks after the round 1 Delphi Survey closed, I sent all participants a twenty-page report of the findings. With this report was a separate six-page document titled "SWM2 preview for panellists" which outlined the theoretical principles underlying the emerging SWM framework structure and included a table showing the domains and subdomains of the Human and Societal level of the SWM framework along with the three Outcome Goal Descriptors for each of the subdomains, as shown in Table 4-7. The preview explained that the focus of the round 2 Delphi questionnaire would be the evaluation of and critical feedback on these Outcome Goal Descriptors and the provisional subdomain titles.

### 4.5.4 Second Iteration

#### *4.5.4.1 Teacher Evaluations of the Second Iteration SWM Framework*

Teachers' evaluations of the overall usefulness of the SWM with nine subdomains added at the Human and Societal level, for thinking about project/course design for Sustainable Wellbeing Education in the second Delphi round, showed improvement over their evaluations of the initial minimal domain structure introduced in the first round. The two distributions are compared in Figure 4-9 for the thirteen teachers who participated in both Delphi rounds.

*Figure 4-9 Evaluations of the usefulness of the SWM framework for thinking about Sustainable Wellbeing education—at the Human and Societal level—comparing round 1 (R1: Domains only) with round 2 (R2: Subdomains added), for the thirteen panellist's who participated in both rounds 1 and 2.*




While twenty-one panellists answered the round 1 question there were just fourteen panellists in round 2, one of whom had not participated in round 1. For the thirteen that participated in both rounds, the mean rating went from 3.15 for the domains alone to 3.69 for the framework including the subdomains and their Outcome Goal Descriptors, i.e. from 'Good' to 'Very Good', albeit, with a

decrease in the degree of consensus from a standard deviation of 0.69 to 0.85. The probability of this difference occurring by chance was estimated by rerandomization to be 7.2% ± 0.3% with 95% confidence. To check that this improvement did not occur as an attrition effect through participants with a low evaluation in round 1 dropping out before round 2, I compared the round 1 evaluations of the minimal 'Domains Only' framework for these two groups. In fact, the thirteen teachers who stayed in the study for round 2 rated the minimal framework more critically in round 1 at an average of 3.15 compared to 3.63 for the eight who did not, although this difference was less significant than that for Figure 4-9. The probability of this difference occurring by chance was estimated by rerandomization to be 15% ± 0.4% with 95% confidence.

Affirming and encouraging comments about the SWM framework's direction and development appeared in panellists' comments throughout round 2. Seven panellists commented favourably about the overall SWM conception and specific aspects of the framework. Mathew, for example wrote, "The subdomains are easy to understand and relate to current issues facing our people and whenua.", and Lucy wrote, "I love this concept and would be eager to implement it in my classes."

There were also numerous helpful critiques and questions, particularly about what teachers considered to be the unnecessarily high-level language used to name the subdomains and express the Outcome Goal Descriptors (OGD). Using, 'feeling', and 'thinking' in place of 'affect' and 'cognition' is an example of one change to the framework made in response to this feedback. Some critiques, however, arose from miscommunications as a consequence of the complexity and scope of what I was asking the participating teachers to 'get their heads around' in this research. The Outcome Goal Descriptors, for instance, were intended to serve only as exemplars that teachers could select from and modify according to their local context. They were not meant to be an exhaustive prescribed list of topics to be covered, but I had not made this intention clear enough. In response to the Ecosphere Outcome Goal Descriptors, Holly wrote: "Again, each of the OGDs [is a] fairly large topic in [itself]. How long are you envisioning each OGD to be taught?"

And then later:

> I think this would be a fascinating curriculum to teach; however, it is HUGE! To do this properly I see it being a full-time course over multiple years. I think some focus on statistics and data is missing. Some of the descriptors seem a little too advanced for the age groups targeted and would potentially suit undergrads more.

Further, Holly was not the only teacher who hadn't picked up that connecting the SWM subdomains to traditional subjects' content and achievement objectives was to be the focus of the third Delphi round. Also problematic was the misalignment between my expectations and those of some teachers about the level of detail required for the goals in a metacurriculum and the teacher time and school resources that would be required to achieve a successful 'Sustainable Wellbeing' educational transformation. As Claire commented:

> I found the first set [of Goals], up to the cultural ones to use too much jargon. I felt they needed to be simplified so that as teachers, it would require a quick look to understand the goals and outcomes rather than unpacking them.

Stephanie had a similar perspective writing:

> The whole framework needs simplifying and clarifying before [it] would be considered useful in a secondary school context. With competing demands for

> educational time, any new initiatives must be user-friendly and straightforward to implement.

The limited time and opportunities that are available to many teachers for significant restructuring of their curricula mean they may need to be supplied with far more detailed guidance, texts and resources before contemplating any move toward novel cross-curricular courses for Sustainable Wellbeing. However, the SWM not only requires students to develop a broad complex systems view of learning but also asks teachers—who have far more developed disciplinary biases—to likewise extend their mastery of unfamiliar vocabulary, emotional contexts, and practical skills.

Deb also commented on the need for avoiding unnecessarily complicated language but accepted that new vocabulary would be necessary for the realignment and centring of the curriculum on Sustainable Wellbeing. Referring to her evaluations of the individual subdomains she commented about the need for coherent curriculum progression across all year levels, writing:

> My ratings were between fair and good. The titles of some of the outcomes would likely need simplifying for students. Would there be any teaching and learning around these subdomains prior to Year 11, maybe a year 10 course that could introduce the vocabulary and key ideas?

Daniel agreed that the wording needed to be simplified wherever possible but conceded that some new conceptual demands on students and teachers might be inevitable given the nature of the transformation being proposed. He wrote: “My only real (minor) gripe is the language being used—Some terms used are also probably too high level for some students, but I'm not sure if that is solvable”.

#### *4.5.4.2 Modifications to the Framework Following the Round 2 Survey*

In response to participants’ feedback from the second Delphi round, some significant changes were made to the emerging SWM framework.

The appropriateness of three of the subdomain titles—Maker-Recyclers, Kaitiaki Hunter-Gatherers, and Rights and Responsibilities—was questioned by enough participants to warrant alternatives being offered for consideration in Phase 3 of the study. In the third Delphi round, Rights and Responsibilities became Equity, Rights and Responsibilities. ‘Kaitiaki Hunter-Gatherers’ became ‘Kaitiaki Custodians (provisional)’. Question 12, toward the end of the survey, offered five alternative titles for participants to rank all of which included the word ‘Kaitiaki’ The most preferred turned out to be ‘Kaitiaki Guardians’. I refer to this subdomain as ‘Kaitiaki Guardians’ from this point on in the thesis.

The subdomain title ‘Maker-Recyclers’ remained problematic for me for more than a year after Phase 3 was complete until I came up with a better way of conveying the idea of a Cyclic economy—favoured by several participants—that goes beyond merely recycling without losing the consistency of the vocational-agentic motif I’d adopted for all three of the Ecosphere subdomain titles. Consequently, I refer to the ‘Maker-Recyclers’ subdomain throughout Chapters 4, 5, and 6 but offer ‘Cyclic Maker-Consumers’ as a more accurate alternative in the Chapter 7 Discussion. To each subdomain, a descriptor of one sentence or a short paragraph was added which expresses what the subdomain is about and how it relates to the other two subdomains within its domain. These descriptors, listed in Table 4-10, were further modified following phase 3 of the study and remain open to new expressions consistent with the ongoing emergence principle of the metacurriculum.

*Table 4-10 The second iteration of the SWM framework's three domains and nine subdomains at the Human-Societal level, showing provisional Titles and Descriptors for each subdomain*

| Domain | Subdomain (provisional titles) | Domain/Subdomain Descriptor |
|---|---|---|
| **Ecosphere** | | **Humanity's relationship with its planetary, ecological, and built environment** |
| | 1 Maker-Recyclers | are responsible for human-built and physically modified environments. |
| | 2 Regenerative-Cultivators | manage human-occupied land and water ecosystems for human sustenance. |
| | 3 Kaitiaki Hunter-Gatherers | look out toward, explore, and seek alignment with untamed, more than human nature. They are conscious of nature's engulfing power and our duty of care toward and need of respect for it. |
| **Social Justice** | | **Humanity's world of social, political, and community relationships.** |
| | 1 Whanau and Community | is concerned with respectful, face-to-face relationships of mutual physical, emotional and intergenerational support. |
| | 2 Rights and Responsibilities | is concerned with equity, balance, and rhythm. The collective strength of shared wellbeing awareness within and between communities and nations. |
| | 3 Power and Influence | deals with humanity's struggle to avoid catastrophic conflict and govern itself for the collective determination of an ecologically sustainable world order that includes mutually beneficial relationships with all other species. |
| **Cultural Vision** | | **Humanity's relationship with its cultural histories, its present, and its future** |
| | 1 Our cultural inheritance | seeks to learn from the treasures and tragedies of our culturally collective past that have led to our present. |
| | 2 Others' cultures and World views | cultivates an appreciation of the enriching and empowering diversity of worldviews amongst humankind in our own time, and the realisations that they can be more or less well adapted to their natural environments, and none can be final. |
| | 3 Cultural evolution and Individual agency | is about the power of the individual to influence history and the collectives' need to foster individuality. It is future-focused on the challenge of creating new connected coherent visions of humanities' direction equal to the present Sustainable Wellbeing challenges we face. |

To help correct the impression that the Outcome Goal Descriptors were prescribing content that must be covered, these statements were relabelled Sustainable Wellbeing Goals (SWG). The verbs used to express the goals were modified to emphasise the engagement of action, feeling, thinking; hands, heart, and head in every SWG. Explicit reference was introduced to the climate change and biodiversity environmental crises in at least one goal in all nine subdomains. The scope of social structural levels appropriate to each subdomain was appended to each goal with phrases such as "across all scales from local to global". The SWG are listed in full in Table 5-8 (Section 5.4.2). SWG that directly reference the United Nations SDGs (Sustainable Development Goals) were also introduced.

### 4.5.1 Preparing Teachers for Delphi Round 3

As I worked through the teachers' responses to the second Delphi survey, it became clear that a round of one-to-one interviews with panellists at that point would be of great benefit to the aims of this project before going on to a third Delphi round. Interviews allow for wide-ranging highly interactive conversations that would illuminate each participant's unique perspective on the proposed SWM framework and how it might serve their educational context in a way that pre-defined survey questions could not.

The last step of Phase 2 of the study was to send the 14 participants who had participated in the second Delphi round a report on the findings of the survey and the resulting modifications to the emerging SWM framework. The covering email (see Appendix B-4) invited the teachers to one-on-one semi-structured interviews in advance of a third Delphi Survey seeking feedback on the modifications to the framework that had resulted from round 2 and the explanations I had provided for them. Six teachers in all agreed to be interviewed. Before their interview, I provided each with an interview schedule (see Appendix C-1) that, in addition to seeking their reflections on the second Delphi Survey round, included questions under the following headings:

- Potential for SWM exploration/implementation in your school
- Relating the SWM subdomains to Learning Areas & Subjects
- Creating an SWM Cross-Curricular Project/Course Outline in the third Delphi round, and
- Formal assessment strategies for an SWM

Five of the interviews were completed in November 2021 before the third Delphi round and the sixth followed in April 2022. In December 2021 I sent an email to the 14 second-round participants thanking them for their participation thus far and explaining my intentions for the third Delphi round to take place from the start of term one 2022. I asked them to consider providing one cross-curricular project/course outline(s) related to one or other of the nine SWM subdomains and designed specifically for year 11, 12 or 13 students.

## 4.6 Summary

Starting with an overview of the three data collection phases of the study this chapter has recounted how a framework for Sustainable Wellbeing education in the final three years of secondary schooling was co-constructed through its first two phases. The panel of experienced teachers (twenty-three in all) has been profiled in terms of their relevant demographic and professional characteristics. Their interpretations of key terms including Sustainable Wellbeing and Metacurriculum have been thematically analysed. Their diverse views on the optimal balance between cross-curricular holistic and subject-based specialist pedagogies for Sustainable Wellbeing education have been presented. Lastly, the emergence of the framework has been described from its theoretically proposed initial two levels and seven domains to its three structural levels and triads of self-similar nested subdomains and Sustainable Wellbeing Goals after two completed Delphi rounds. Chapter 5 continues the presentation of findings into Phase Three where the nine Core-Participant teachers applied the second iteration of the SWM framework to one of their current teaching units and evaluated its applicability to their whole school environment.

# Chapter 5 Using the Sustainable Wellbeing Metacurriculum framework

## 5.1 Overview

In this chapter, I show how, in Phase 3 of the study, the nine Core Participants—introduced in Table 4-1—outlined their current teaching practice and school context in relation to Sustainable Wellbeing, and provided critical feedback on how the framework could be further developed. Chapter 5 also takes the next step in developing the 'Education System Attractor' analogy—introduced in Section 2.3.4—that frames my interpretation of the main question motivating this research—What would enable secondary schools in Aotearoa New Zealand to establish a Sustainable Wellbeing centred Metacurriculum (SWM) for their years 11 to 13 students?

While the ongoing SWM framework co-construction seeks to define the dimensions of the relevant educational space, anticipating the Attractor's SWM configuration theoretically and facilitating its emergence from within as it were, the Core Participant case studies serve to characterise the Attractor SWM configuration and paths toward it empirically at the whole school level and thus describe its emergence from without. In this external sense, the SWM framework can become useful both as a shared point of reference for structured Sustainable Wellbeing curriculum and course design and as a benchmark against which schools' progress and student achievement toward education centred on Sustainable Wellbeing might be assessed.

In Phase 3 of the study, I wanted to first discover how well the whole diverse range of Sustainability and Wellbeing-oriented courses and projects my participants were currently teaching could be usefully characterised and differentiated using the SWM Domains and Subdomains. Second, I wanted to assess how and to what extent the ideal of a whole school approach to Sustainable Wellbeing involving all learning areas—through a combination of cross-curricular holistic and subject-based specialist pedagogies—was or might be realised in these schools. A key component to informing both these inquiries is expressed in my second research sub-question: What links would/could teachers establish between the SWM framework, the New Zealand Curriculum learning areas, and National Certificate of Educational Achievement (NCEA) standards or other appropriate school leaver qualifications?

The data gathered in this phase of the study was provided through a mix of complementary research instruments including—in approximately this chronological order: a series of one-to-one semi-structured interviews, the third Delphi Survey round, school documentation provided by participants, replies to my follow-up questions by email and in two instances webinars that participants recorded after the third Delphi round was complete, in June and October 2022. As a key component of this phase, the teachers were asked to use the co-constructed framework to outline an example of a project or course from either their current or planned teaching timetable and, based on this exercise, to evaluate and critique the usefulness of the framework for curriculum design.

The terms 'Project' and 'Course' were used in the first two Delphi Survey rounds to refer to Units of teaching involving a series of Cross-Curricular Holistic (CCH) or Subject-Based Specialist (SBS) lessons respectively, within a time frame of no more than one school year. Participants readily adopted the CCH and SBS terminology for recognisably distinct modes of timetabled lessons, but the words 'project' and 'course' were used variously by teachers in association with lessons of either mode. From

this point on in the thesis, I use the phrase 'SWM Units' (or simply 'Units') to refer collectively to Projects and or Courses.

In the third Delphi survey round, I introduced the notion of Anchoring and Connected subdomains to facilitate the characterisation of Unit outlines using the SWM framework based on what I had learned from participants in the interviews and earlier rounds of the study about their Sustainable Wellbeing teaching. Each Unit has a nominated Anchoring SWM subdomain which functions as an enabling constraint in that the Unit begins and ends in this subdomain and the main Sustainable Wellbeing Goals for students to achieve relate particularly to this subdomain. The Anchoring Subdomain is then supported by as many subordinate Connected subdomains as the planning teacher(s) decide are appropriate for their particular locale, context and priorities.

Eight of the nine Core Participants provided Unit Outlines. Anita provided two and Claire provided a partial outline. I have included Claire in the Core Participant group because her proposed unit 'Working Title' was the only unit provided by an English specialist, single-subject teacher, and one of only two of the units that were anchored in the SWM framework's Cultural Vision domain. The ninth Core Participant, Brent, is an associate principal at a large urban mainstream secondary school with a well-established cross-curricular programme for years 9 and 10 students. He was not able to provide a Unit outline designed for years 11 to 13 students but did offer valuable insights into why his school has had difficulty extending its cross-curricular programme beyond year 10. The number of Unit Outlines provided by each teacher and the research instruments through which each contributed to Phase 3 of the study are shown in Table 5-1.

*Table 5-1 The nine Core Participant teachers with the number of exemplar SWM Unit Outlines each provided and through which of the study instruments.*

| Participant | SWM Units | Interview | Delphi 3 | Webinar |
|---|---|---|---|---|
| Anita | 2 | ■ | ■ | ■ |
| Daniel | 1 | ■ | ■ | |
| Deb | 1 | ■ | ■ | |
| Mathew | 1 | ■ | ■ | |
| Nicola | 1 | ■ | | |
| Rebecca | 1 | | | ■ |
| Tara | 1 | | ■ | |
| Claire | 1 | | ■ | |
| Brent | 0 | ■ | | |

Six of the Unit Outlines were defined by teachers using the SWM framework via the third-round Delphi Survey, namely, the Units provided by Daniel, Deb, Mathew, Tara, Claire, and one of Anita's two. I have called these units 'Teacher-Framed'. I constructed the outlines of Anita's second Unit and those provided by Nicola and Rebecca using the SWM framework from the information provided by these teachers through their interviews, Webinars, school documents and email conversations. These units I have called 'Researcher-Framed'. The schedule prepared for teachers who participated in the semi-structured interviews is reproduced in Appendix C-1 and the third Delphi Survey questionnaire is in Appendix C-2. In the following section, I provide an overview of the nine 'Teacher-Framed' and 'Researcher-Framed' Units comparing their SWM framework Domains and Subdomains, Timetabled lesson structure and Teaching teams.

Section 5.3, is a case-by-case analysis of the nine 'Core Participants' schools which examines the educational values, timetable structures, and physical, community, and collegial contexts in which these teachers were working when these Sustainable Wellbeing Units were being taught. The data for this section was drawn chiefly from the semi-structured interviews and webinars.

Section 5.4 details how the SWM framework Sustainable Wellbeing Goals (SWG) were applied by the participants (or the researcher) to define and characterise the nine SWM Units. It also explores how these Cross-Curricular Holistic (CCH) elements of the framework are connected, or constrained from connecting, with New Zealand's established secondary school curriculum and assessment systems, i.e. the New Zealand Curriculum (NZC) Achievement Objectives (NZ Ministry of Education, 2007, 2015b) and the NCEA standards (New Zealand's standards-based school leaving qualification). This section also reports on the teachers' points of view (as of October 2022) concerning how supportive of Sustainable Wellbeing Education the existing NCEA system is, and the new standards currently being developed under the New Zealand government's Review of Achievement Standards (RAS) might be.

Section 5.5 reviews the Participants' evaluations of the SWM framework and their comments on how useful is it for thinking about and planning Sustainable Wellbeing education. Insights into how the framework might be further developed and improved are gained from comparing the Core with the Non-Core participants' evaluations.

## 5.2 Nine SWM Units

The third round Delphi Survey asked teachers to define their pedagogical approach as either Cross-Curricular Holistic (CCH) or Subject-Based Specialist (SBS). They were also asked to nominate an 'Anchoring' Domain and Subdomain for each SWM Unit in the third round Delphi Survey, as described in Section 3.5.4. The choice of a Unit title and an Anchoring Subdomain were the only 'forced' responses in the survey meaning that participants could not progress to the rest of the survey without making a definite choice from the nine available subdomains shown in Table 4-10.

The nine SWM units are named and compared in Table 5-2 in terms of their SWM anchoring domains and Subdomains; intended student year level(s); and current status. The Unit titles have been given a two-letter code suffix in square brackets which indicates the primary and fractal secondary Domains of the Anchoring Subdomain each has been assigned. The codes follow the lettering and colour coding convention used in Table 3-2 and Table 4-7; E for Ecosphere, S for Social Justice, and C for Cultural Vision. A table showing how the New Zealand school year levels align with student age and the levels of the NZC and the NCEA is provided in Appendix C-8.

The three SBS courses are anchored in each of the three SWM domains—Ecosphere, Social Justice, and Cultural Vision. Five of the six CCH projects described in Table 5-2 are anchored in the SWM's Ecosphere domain. The sixth, the Researcher Framed project 'Te Ara-Year 12', I have anchored in the Cultural Vision domain. Four of the six CCH projects are described as being designed for, or adaptable to, multi-year level student groups in years 11 to 13. The other two projects were intended for specific year levels but were also in practice adapted for students in other year levels. The "Āhuarangi Climate" project was intended for year 11, but due to school staffing and subject demand exigencies, the class in 2022 ended up including year 9 to year 11 students. In her interview, Anita explained that:

> We thought we might get mainly year 11s. But it turned out that there wasn't enough social science at level five in the curriculum. So we got asked to make it a [NZC] level five-six class. So we've got a few younger students … as well, who are not so focused on NCEA.

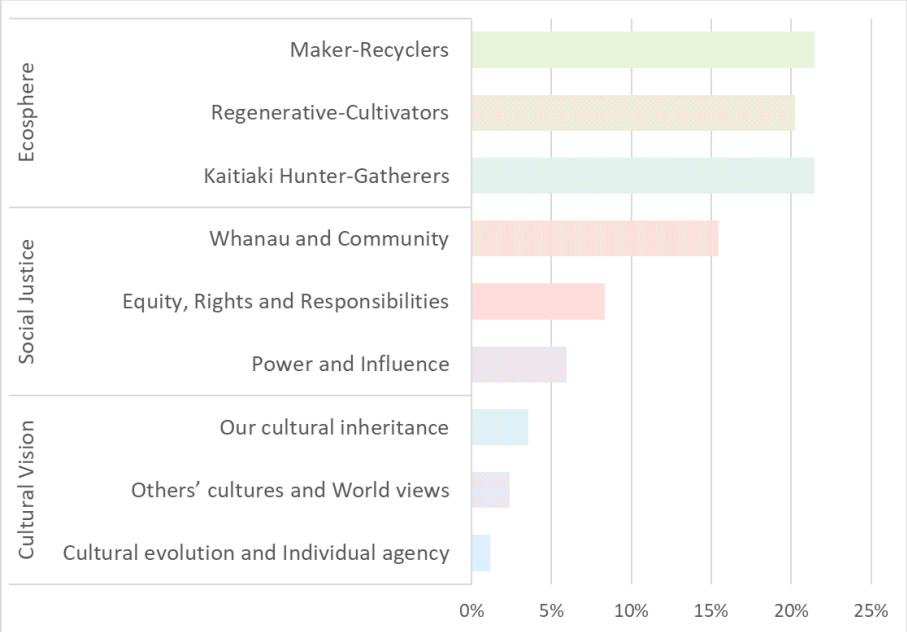
*Table 5-2 Overview of the nine SWM Units; Six Teacher-Framed and three Researcher-framed*

| Teacher | Unit title | Anchoring Domain | Anchoring Subdomain | Year levels | Currency Status (2022) |
|---|---|---|---|---|---|
| | | *The three Teacher-Framed Subject-Based Specialist (SBS) Courses* | | | |
| Mathew | **Business Studies-Level 2 [EC] (Social Sciences)** | Ecosphere | Kaitiaki Guardians | Year 12 | current and ongoing |
| Anita | **Education for Sustainability [SS] (Social Sciences)** | Social Justice | Equity, Rights, and Responsibilities | Year 11 | current and ongoing |
| Claire | **Working Title [CS] (English)** | Cultural Vision | Others' Cultures and World views | Adaptable to Years 11 to 13 | Proposed for 2023 or later |
| | | *The three Teacher-Framed Cross-Curricular Holistic (CCH) Projects* | | | |
| Tara | **AGE Adventure [ES]** | Ecosphere | Regenerative-Cultivators | Combined Years 11 & 12 | Proposed for 2023 |
| Deb | **Harsh Summer [EE]** | Ecosphere | Maker-Recyclers | Adaptable to Years 11 to 13 | current and ongoing |
| Daniel | **Urban Farming Outreach [ES]** | Ecosphere | Regenerative-Cultivators | Combined Years 11 to 13 class | current and ongoing |
| | | *The three Researcher-Framed* Cross-Curricular Holistic *(CCH) Projects* | | | |
| Anita | **Āhuarangi Climate [EC]** | Ecosphere | Kaitiaki Guardians | Year 11 | current and ongoing |
| Nicola | **Self-Watering Planter Boxes [ES]** | Ecosphere | Regenerative-Cultivators | Combined Years 11 to 13 class | (2013-19) |
| Rebecca | **Te Ara-Year 12 [CS] (titled 'Global Living' before 2022)** | Cultural Vision | Others' Cultures and World views | Year 12 | current and ongoing |

Five of the nine units were currently established projects or courses in their respective schools in 2022. One was no longer current but had been taught between 2014 and 2020 when the teacher, Nicola, resigned to undertake a Master's degree in Education for Sustainability. Three units were still at the proposal or planning and yet-to-be-implemented stage in 2022.

Six of the nine Units in Table 5-2 are anchored in Ecosphere subdomains. This emphasis on the Ecosphere was already apparent among the 14 teachers who participated in the second Delphi Survey Survey round when asked to rank the SWM Subdomains they would most prefer to work in. The

*Figure 5-1 The distribution of 14 teachers' preferences for the CCH Subdomains Teaching Teams they would want to join in a hypothetical SWM framework timetable for year 11-13 students.*

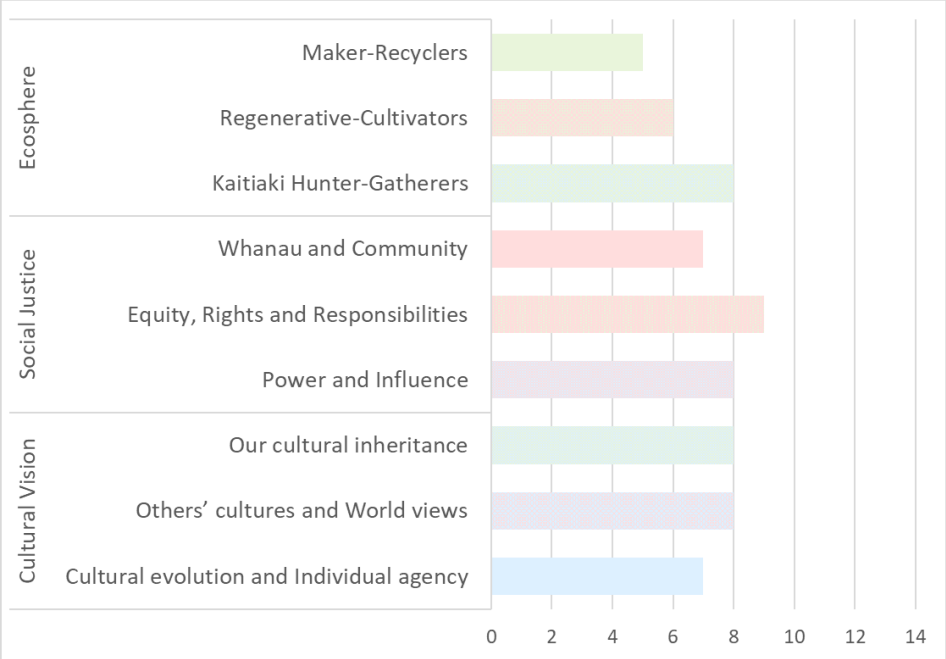



participants were asked to consider being invited to join a Cross-Curricular teaching team creating a Unit anchored in one of the SWM Subdomains—assuming the timetable supported a ratio of 40:60 CCH to SBS lessons. They could select and rank up to three Subdomains. In scoring the preferences I assigned 3 points for a first choice, 2 for a second, and 1 for a third. The resulting distribution of total preference points across the Subdomains is shown in Figure 5-1. Not only did the Ecosphere domain claim the majority of preference points (63%), but within each domain the subdomains with the Ecosphere as their secondary fractal domain—'Whanau and Community', and 'Our Cultural Inheritance'—also had the highest share (or first equal, in the case of 'Maker-Recyclers') of preference points.

The skewed distribution of teachers' subdomain preferences in Figure 5-1 appears at least in part due to their perception of the adequacy of their schools' current curricula. When asked, "In your school currently, for which of the Sustainable Wellbeing (SW) subdomains, if any, are some or all of the outcome goals being effectively addressed in the years 11 to 13 curriculum, that you know of?"; only five teachers regarded the Maker-Recyclers subdomain as effectively addressed. As shown in Figure 5-2, the distribution of responses across the SWM subdomains is more uniform than in Figure 5-1 but the two Ecosphere subdomains most preferred for team teaching—Maker-Recyclers, and Regenerative-Cultivators—were considered by participants the least effectively addressed in their schools. Even the most effectively addressed subdomain—Equity, Rights and Responsibilities—was only considered so in 9 of the 14 schools. The meaning of "effectively addressed" in this question of course has no generally valid interpretation for New Zealand schools or even among these 14 but it is of note that these teachers are most interested in focusing their enthusiasm for Sustainable Wellbeing team teaching on the Ecosphere domain of action where they see their schools as being weakest,

rather than on Cultural Vision, and Social Justice domains which are more aligned with thinking and feeling and which they feel relatively more confident about.

*Figure 5-2 The numbers of participants considering each of the SWM subdomains as effectively addressed in their school. (N=14)*



## 5.3 Ten SWM School Case-Study Vignettes

### 5.3.1 Section Overview

This section presents ten case study vignettes that explore the nine Core Participants' perspectives on their teaching for Sustainable Wellbeing within their whole school contexts. The full case study vignettes are provided in Appendix C-3. The summaries are presented under the teachers' names and the titles of the SWM Units they outlined for this study in the order they appear in Table 5-2. Anita provided two SWM Units, hence the ten case studies. As explained in Section 5.1, Brent did not provide an SWM Unit outline for years 11 to 13 students but did offer crucial reflections on the SWM framework and the challenges of cross-curricular, sustainability and wellbeing-centred education at this level of schooling, from his perspective as an Associate Principal of a large, urban Mainstream Secondary school. Brent's description of his school's cross-curricular 'Innovation Stream' curriculum for years 9 and 10 and his reflections on the SWM framework are presented in Section C-3.11.

The timetabling and collegial collaboration arrangements of the nine SWM units are compared below in two tables. Table 5-3 below presents the timetabled distribution and duration of lesson periods for each Unit. It also includes the teachers' preferred share of the timetable devoted to CCH project-based lessons at the time of the Delphi round 1 survey and their reconsidered responses in the Delphi third round. The nine metacurriculum units show a wide range of timetabled lesson patterns from short intense units ('Business Studies Level 2', 9 weeks at 5 hours per week) to extended series of dispersed weekly lessons ('Working Title', 30 weeks, 1 hour per week, and 'Te Ara-Year 12', 35 weeks, 1.8 hours per week). The range of total hours per year for a unit was also broad. The two yet-to-be-implemented units, 'Working Title' and 'AGE Adventure', envisaged as little as 30 hours and up to 300 hours respectively. There is no systematic difference in these lesson patterns between the CCH project and the SBS course units.

In round 1 of the Delphi survey, teachers were asked:

> What share of the weekly senior school timetable would you ideally like to see dedicated to cross-curricula Sustainable Wellbeing-directed learning as compared to specialised subject-directed learning?

In round 3, teachers were asked:

> In your school timetable, what percentage of lesson times reserved specifically for the Cross-Curricular Project lesson mode, were available or are you recommending?

All nine of the Core teachers including Brent, who does not appear in Table 5-3, had available or were recommending, at least a 25% share for CCH lessons at the time of the first Delphi Survey. Brent chose 50%. Five of the six teachers who participated in all three Delphi rounds did not substantially change their view on the ideal CCH lessons proportion of the timetable while Claire increased her ideal/recommended CCH proportion from 13% to 40%. The mean proportion for these six was 47% with a standard deviation of just 16%. Three teachers, Brent, Nicola and Rebecca—whose phase three participation was in the form of interviews, personal communications or webinar presentations—did not participate in Delphi round 3 and so did not provide a direct answer to this question. Nicola chose 88% as her ideal share in round 1. In her interview, she described her project, which was the only cross-curricula teaching happening in that school at the time, as requiring six hours per week on average. Rebecca's ideal CCH proportion was 50% in round 1 but the reality of her school timetable was still at just 10% CCH lessons in 2022. Both teachers were therefore working with significantly less than their ideal proportion of timetabled CCH lessons.

*Table 5-3 Timetabling details for the nine SWM Units showing actual hours assigned and the teacher's recommended timetable share for Cross-Curricular Holistic (CCH) mode lessons. Units Anchored in the Ecosphere, Social Justice, and Cultural Vision domains are colour-coded green, red and blue respectively.*

| Teacher | Unit title | Weeks per year[4] | Total hours | Hours per week | CCH Mode Share % | |
|---|---|---|---|---|---|---|
| | | | | | Delphi Round 1 | Delphi Round 3 |
| *The three Teacher-Framed SBS Courses* | | | | | | |
| Mathew | **Business Studies-Level 2 [EC]** | 9 | 45 | 5.0 | 25% | 30% |
| Anita | **Education for Sustainability [SS]** | 33 | 99 | 3.0 | 38% | 40% |
| Claire | **Working Title [CS]** | 30 | 30 | 1.0 | 13% | 40% |
| *The three Teacher-Framed CCH Projects* | | | | | | |
| Tara | **AGE Adventure [ES]** | 26 | 300 | 11.5 | 75% | 75% |
| Deb | **Harsh Summer [EE]** | 10 | 30 | 3.0 | 38% | 40% |
| Daniel | **Urban Farming Outreach [ES]** | 15 | 65 | 4.3 | 50% | 55% |
| *The three Researcher-Framed CCH Projects* | | | | | | |
| Anita | **Āhuarangi Climate [EC]** | 33 | 198 | 6.0 | 38% | 40% |
| Nicola | **Self-Watering Planter Boxes [ES]** | 10 | 60 | 6 | 88% | - |
| Rebecca | **Te Ara-Year 12 [CS]** | 35 | 63 | 1.8 | 50% | - |

Table 5-4 shows the number of teachers and other collaborators in the teaching team for each of the nine SWM Units along with the teachers' disciplinary specialities. The three Teacher-Framed Subject-Based Specialist (SBS) Courses are all solo teaching efforts by Mathew, Anita, and Claire although Anita makes extensive use of external providers of sustainability education courses and resources to support her 'Education for Sustainability' Unit.

[4] **Assuming 35 weeks are available**

*Table 5-4 Teaching and Collaboration teams for the nine SWM Units showing the number of team members and the teachers' disciplinary specialities. Colour coding is as for the table above.*

| Teacher | Unit title[5] | Teacher's own LAs | No. Other Teachers Involved | Other Teachers LAs | No. Other Collab-orators[6] |
|---|---|---|---|---|---|
| | | *The three Teacher-Framed SBS Courses* | | | |
| Mathew | **Business Studies-Level 2 [EC]** | Social Sciences | None | N/A | None |
| Anita | **Education for Sustainability [SS]** | EfS, Social-Sciences, Sciences, English | None | N/A | Many |
| Claire | **Working Title [CS]** | English | None | N/A | None |
| | | *The three Teacher-Framed CCH Projects* | | | |
| Tara | **AGE Adventure [ES]** | EfS, Sciences | Two | English, The Arts, Health & PE, Learning Languages, Maths & Statistics, Science, Soc Sci, Technology | Three |
| Deb | **Harsh Summer [EE]** | Technology | One | Science | One |
| Daniel | **Urban Farming Outreach [ES]** | EfS | One | English, Social Sciences | Five |
| | | *The three Researcher-Framed CCH Projects* | | | |
| Anita | **Āhuarangi Climate [EC]** | EfS, Social-Sciences, Sciences, English | Two | Philosophy, Science | None |
| Nicola | **Self-Watering Planter Boxes [ES]** | Sciences, EfS | None | N/A | Five to seven. |
| Rebecca | **Te Ara-Year 12 [CS]** | Arts, EfS | Three | Sustainability, philosophy, Te Ao and Te Reo Māori | Many |

Among the six CCH project units only Nicola's 'Self-Watering Planter Boxes' was a solo teaching effort. The other five Units involved collegial teams of between two to four teachers in the school. Nicola, however, like Anita, relied heavily upon external providers of skills, knowledge and resources to make her Unit effectively project-based and rewarding for students.

[6] Some Units involve year 13 student leaders guiding younger students: 'Self-Watering Planter Boxes', 'Te Ara-Year 12'

### 5.3.2 Mathew—Business Studies Level 2

As noted in Section 5.2, Mathew hadn't taught this Unit himself and was describing it on behalf of colleagues who had. He also provided me with copious documentation on the school's graduate profile and year-level curricula from which much of the following contextual detail has been drawn. The document 'Year 12 course booklet 2022' introduces this course as follows:

> How do you know if you have a good idea? Ask your customers, right? Take the guesswork out of running your business. Create a survey and conduct market research on your target market to find the best possible combination of price and product. The opportunity to plan, run and review a real business throughout the year is the focus for business studies this year. Students can opt into the nationwide Young Enterprise Scheme to add extra value and opportunity to their business activity (highly recommended).

In the round 3 Delphi survey, Mathew explained the context for the 'Business Studies - Level 2' course with the phrase "Demonstrate an understanding of how a large business responds to outside factors". These words are taken directly from the title of the NCEA standard 90844 Busn Studs EAS 2.2. The standard's defining document makes culturally inclusive reference to "Māori business concept(s)", and standard 91384 'Carry out, with consultation, an innovative and sustainable business activity' was also introduced to this course in 2022 ( see Appendix C-7.1.2). By his choice of 'Kaitiaki Guardians' as the Unit's SWM framework anchoring subdomain and by adding the Connecting subdomain of 'Power and Influence' (see Section 5.4.2.1), Mathew indicates that sustainability, social justice and environmental wellbeing are key learning goals for students taking 'Business Studies - Level 2'.

Where does Mathew's school lie in terms of its trajectory relative to the SWM proposal viewed as an educational attractor configuration? The school addresses the Social and Cultural Subdomains across a wide range of disciplines. The explicit inclusion of "Loss, Death and Grief" in religious education for year 12, at Mathew's school, for instance, could improve the SWM framework by being explicitly included in the 'Cultural Evolution and Individual Agency' subdomain descriptor. The school exemplifies strong school Leadership for Sustainable Wellbeing in that Religious education, which includes the comparative study of other spiritual traditions, is mandatory for all students. The school also reserves timetable space for all students to participate in project-based learning which can also earn NCEA credits. Some elements of Sustainable Wellbeing education such as the value placed on nurturing student voice in school life including curriculum development; the extent of and structural support for CCH team teaching at all year levels in the school; and the commitment to on-campus and local environmental sustainability practices; are not as strong as they are in other Core Participants' schools.

### 5.3.3 Anita—Education for Sustainability

Anita teaches the subject-based specialist NCEA level one course 'Education for Sustainability' designed for year 11 students, in three periods a week. There are 24 one-hour periods in the school's weekly timetable. Fifteen are reserved for SBS lessons organised into five blocks (lines) of three lessons each as shown in Table 5-5, coloured red, yellow, green, blue, and purple. Students choose one from among several concurrently scheduled course options in each of the five colour blocks to fill their timetables. Six lessons of the total 24 are designated as home base (HB), i.e. pastoral and study

guidance time when the students are with their home base teacher (learning advisor) and home base classmates. The last three lessons of the week making up the 24 total are called Hapori, a time for all students to be involved in CCH projects. The Te Reo Māori term 'Hapori' translates as a "section of a kinship group, family, society, community" (Moorfield, 2003). Anita explained:

> [On] the fifth day Friday, we do what we call Hapori, which is projects. So a lot of the teaching staff are divided into project groups. I'm in one that ... is all around kai and food. And we cook food and we grow food. There are other groups that go out and do Outdoor Ed. Other groups do art. And we do [that] all day.

*Table 5-5 The weekly timetable template for Anita's school*

| | Rāhina/ Monday | Ratū/ Tuesday | Rāapa/ Wednesday | Rāpare/ Thursday | Rāmere/ Friday |
|---|---|---|---|---|---|
| 9am | HB | HB | HB | HB | HB |
| 10am | | | | | HB |
| 11am | | | | | |
| 11.20am | | | | | Hapori |
| 12.20pm | | | | | |
| 1pm | | | | | Hapori |
| 2pm | | | | | Hapori |

Years 11 to 13 students can take NCEA standards in any of their SBS lessons. The six lessons of Home Base can also be used to support students with their work toward any NCEA standards although not in a planned cross-curricular way necessarily. I asked Anita, "Are many other teachers at [your school] using a cross-curricular approach to the extent that you are?", she replied:

> I don't think so. … There's a little bit in Home Base, which is like your pastoral centre. You meet with a group of kids every day in the morning. And there is scope in there for teachers to offer standards to students individually if they're familiar with [the standard]. ...It's an hour a day, but, a lot of it is self-directed for the students. So, for example, I conference with each student for 15 minutes a week. And if they said to me something [like], I really can't get this English standard or

> [these] literacy credits. I might think, well, I'm familiar with that standard. Or I know there's this one over here. Why don't you have a go with that and I'll just support you one on one. ... On Friday [morning], we have two hours together, we could do something then if we wanted to do [but] at the moment, we're just having fun and bonding with each other, this term.

Anita's 'Education for Sustainability' course is an exemplar of how cross-curricular this subject is. The students that choose this course and stay with it for the full year are exploring all three subdomains of the Ecosphere through solar energy projects, the school organic garden, and a river health monitoring project, with support from external consulting firms, the city council, and organisations like Kaitiaki wai—Waterwatch NZ. They also grapple with Social Justice issues which Anita says, most students seem to prefer over the 'in Nature' Ecosphere projects.

Where does Anita's school lie in terms of its trajectory relative to the SWM proposal viewed as an educational attractor configuration? The school strongly encourages student voice in curriculum development and is prepared to structure timetables to enable CCH team teaching involving a wide range of learning areas. It also relies on the sustainability expertise of community organisations to extend its Ecosphere education to projects outside the classroom and gives high priority to on-campus school sustainability practices most notably through its involvement in the city's shared Climate Action Campus initiative. Anita's SWM Units give a high priority to the Social Justice and Cultural Vision domains of the SWM and there are a range of learning areas contributing to these courses. Awareness of and appreciation for Te Ao Māori and other indigenous worldviews for students to compare and contrast with dominant Western cultural values is fostered in both Units. Facilitating student choice and interests is valued highly by the school community to the point that it can undermine the sequential development of students' subject-based knowledge and the holistic design of coherent, cross-curricular courses such as 'Education for Sustainability' and 'Āhuarangi Climate'.

### 5.3.4 Claire—Working Title

As noted in Section 5.2, Claire, the author of 'Working Title', started the Delphi survey round 3 but got no further than describing her timetable intentions for this unit by explaining:

> I would weave it into our English curriculum throughout the year. … Knowing that senior students leave after around 3-4 weeks in term four, I thought it would be ideal to do one hour per week over three terms. But also taking into account other activities (Teacher Only Days, public holidays for example) there would be scope to push it into term four.

In the first round of the Delphi survey, she expressed her sympathy for the intent of this research project but also her frustration with the constraints of what she experiences, in common with several of the other participating teachers, as an overcrowded curriculum. In the following quotation "lower area" refers to her choice of 13% in response to the question: What share of the weekly senior school timetable would you ideally like to see dedicated to cross-curricula Sustainable Wellbeing directed learning as compared to specialised subject-directed learning?

> It would be nice to have sustainable wellbeing offered more often however I had to choose the lower area because thinking about my own timetable, when would

> I find time to teach them what they need if one period a week was dedicated NOT to English? We have to somewhat teach to the assessments and there is only a limited amount of time to do that.

Claire's school, an urban, 'mainstream secondary', co-educational, has by far the largest total roll (2,105) of the eight schools that provided SWM unit titles for this study. It was interesting to note that while she chose 13% as her ideal CCH share of the timetable in round 1, by the time she reached round 3 she was recommending 40%. I did not have the opportunity to interview Claire so cannot comment with much insight about where her school may lie relative to the SWM proposal viewed as an educational attractor configuration. Her survey responses suggest that her school context may be similar to Brent's (described in Section C-3.11). Both are state Co-Ed, mainstream Secondary schools (Year 9-15) with similar total rolls of just over two thousand. Cross-curricular, team teaching in years 11 to 13 does not appear to be an option that Claire would be considering as a possibility, at least for English teachers at her school.

### 5.3.5 Tara—AGE Adventure

'AGE Adventure', like Claire's 'Working Title', is an aspirational yet-to-be-implemented unit. However, Tara sees it as a CCH project requiring 300 timetabled hours over a full school year in marked contrast to Claire's more modest SBS course 'Working Title' for which she would allocate one period per week and just 30 hours in total. As a deputy principal in a younger, Special Character, and much smaller school, Tara is arguably in a better position to realise her vision than Claire. Tara describes the 'AGE Adventure' project as follows:

> A group of pioneer students are heading up to our 80-hectare farm [about 50km away from the school] which is a mix of native bush and farmland and bordering [a River]. Much mapping, clearing, and planting is needed to regenerate this space. The opportunity also provides learners with a connection to nature to enhance wellbeing on a weekly basis.

Where does Tara's school lie in terms of its proximity and direction of travel relative to the SWM proposal viewed as an educational attractor configuration? The vision statement on the school's website states "Our vision is to help students become curious, creative and compassionate learners by making their education meaningful and highly relevant to the changing world we live in." Student agency is prioritised through encouraging self-directed learning and individualised programmes tailored to each student's strengths and interests which allows the boundaries between CCH and SBS studies to be fluid and similarly responsive. Team teaching and fostering collaborative relationships with the parent and local community are seen as being integral to the success of the envisioned 'Age Adventure' Unit. The Unit prioritises goals related to the Ecosphere and Intra and Interpersonal wellbeing domains of the SWM framework. It is less clear how the Social Justice and Cultural Vision domains will be addressed. The school is offering NCEA qualifications but the restricted number of student places available limits the number of teachers employed and the range of subject expertise offered at the senior secondary school level. The school's fee schedule is also a significant barrier to the accessibility of this education to students in the wider community.

### 5.3.6 Deb—Harsh Summer

In her project outline, Deb described the context of 'Harsh Summer' as follows:

> This is a technology project using the design thinking process [steps] of empathy, define, ideate, prototype, and test. The project looks at the sun's harmful rays in New Zealand and their effects on society. It begins with a scientific look at what makes these rays so harmful, working with empathy to appreciate how these rays affect society. The basic concept is to design a product that … an end-user can use to protect themselves from the sun. The majority of the learning will be in the classroom, around school …. I would want them to attend EOTC [Education Outside the Classroom] for a day. [That part of the] project has not been trialled so could be extended.

Although Deb defined 'Harsh Summer' as a CCH project, she has conceived of it as located within her specialist learning area of technology and its scheduled subject-based lessons in the school timetable. The school at which she was teaching at the time had no allowance in the timetable specifically for team-taught 'cross-faculty' Units, so this unit didn't meet the formal definition of a CCH project that I had suggested to participants. It is, though, certainly a 'project' in the practical sense of requiring each student to design and make an original product. It is also holistic in that "It begins with a scientific look at what makes these rays so harmful, working with empathy for appreciating how this radiation affects society".

Where does Deb's school lie in terms of its proximity and direction of travel relative to the SWM attractor configuration? According to its website, the school's core values are "Caring, Love and Respect, Integrity, Perseverance and Excellence." Sustainable Wellbeing, in its social and cultural senses, is implicit but its nature connectedness sense is not explicitly mentioned. Developing student agency through allowance of independent project space in the timetable did not appear to be a priority for the school and Deb herself assumed that the success of her course depended primarily on strong teacher supervision. There was little evidence of cross-curricular team teaching at this school. Deb was one of the teachers (the other being Nicola) who were working in departmental silos within the biggest and also lowest decile schools in the Unit group, both with relatively large non-European/Pākehā student rolls. 'Harsh Summer' is an example of a project developed and taught by an able and social-wellbeing-motivated teacher in a learning area vital to our sustainable future but severely constrained from realising its potential within a school system habituated to prioritising academic disciplinary structures. She was also very aware of the need for Pākehā teachers like herself to adopt a more humble and culturally inclusive approach toward their multi-ethnic local communities and the challenges that that duty of care brings.

### 5.3.7 Daniel—Urban Farming Outreach

'Urban Farming Outreach' is a project provided by Daniel's Trades Academy for a small group of ten to fifteen year 12 and 13 students attending a central city, decile 9, 'Mainstream Secondary' School with a roll of over 1,300. Daniel describes the unit as follows:

> Based out of Kaicycle Urban Farming [Wellington] a mix of year 12's and 13's [from a central city High School] have to use their recently acquired urban farming/sustainable food systems knowledge by running an outreach/educational

> project in their school and/or community that inspires and educates people to support sustainable food systems.

Daniel is currently based in central Wellington and teaches three units for the Trades Academy: a Restoration course, which is based around conservation skills, an extracurricular after-school course which is mostly for Environmental student leaders from schools across Wellington, and the 'Urban Farming Outreach' unit he has outlined for this research study.

The pedagogy is project-based with students spending around eighty percent of their time in Education Outside the Classroom (EOTC). In describing the Restoration course Daniel explains the importance of volunteer conservation workers to the success of this course.

> [The course] starts off with, a term of helping out with conservation volunteers doing nursery work, seed saving, site assessment, and, site prep sort of stuff. And then they'll do some tree planting and then they'll do some pest control work. ….
> ... to get my students out in the field, I need conservation volunteers to help me out. Because I've got 10 plus students, [the] restoration course, has about 15 students, max, So health and safety, I can't just take them out in the bush by myself all the time, I need someone with me. So it's just worked out that I've … partnered with conservation volunteers, and they get their outcomes of getting trees in the ground, basically, with the students, and they help me out with a co-facilitator for the weeks I'm out with them. And they learn, … from that co-facilitator as well. He's awesome.

Where does Daniel's Academy lie in terms of its trajectory relative to the education attractor SWM configuration? According to its website, the Academy's mission is "to enable young people to make a living through enterprise while regenerating the planet and its people". Its vision is "to build a culture of sustainable regenerative enterprise and kaitiakitanga across Aotearoa." The vocational employment orientation and education outside the classroom focus of the Academy mean that the development of student agency in partnership with the supervising teacher and appropriately skilled instructors from the local community is intrinsic to all its courses.

The Academy's campuses are widely scattered across the motu (country) and its total student roll is, as yet small. These realities limit both the accessibility and range of its offerings, but not the ambition of its growth plans. Collaboration between the Academy's teachers and teachers in secondary school is already part of its business model. The academy has identified a gap in the secondary schooling sustainability education ecosystem that it aims to fill first through direct provision of courses for students, and then eventually and more effectively, through teacher education. The Academy's approach to NCEA qualifications may be unique for year 11 to 13 students in Aotearoa in that it enables vocational students to combine their specialist sustainability-oriented training accreditation with the cross-curricular holistic, academic, Education for Sustainability, Achievement standards. The Academy has a strong social justice and culturally-inclusive kaupapa (philosophy) through its tangata whenua (people of the land) roots.

### 5.3.8 Anita, Adam, and Ben—Āhuarangi Climate

In their 'Course Overview' booklet for students, Anita, Adam, and Ben introduce the cross-curricular goals of their 'Āhuarangi Climate' Unit as follows:

**Introduction** Te Huringa o Te Āhuarangi / Climate Change is one of the biggest issues facing humanity. What to do? Put your head in the sand, or educate yourself and be on the right side of history? The purpose of this course is to equip you with the knowledge and skills to:

- Understand the science behind climate change;
- Understand how people's beliefs, values and behaviours affect their responses to climate change;
- Look after your hauora / wellbeing;
- Examine solutions; and
- Make change.

The 'Āhuarangi Climate' Unit is a companion course to Anita's 'Education for Sustainability' course. These units coexist within the timetable shown in Table 5-5. Anita is solely responsible for 'Education for Sustainability' but she team-teaches 'Āhuarangi Climate' with her colleagues Adam and Ben (also pseudonyms).

I have described where Anita's school lies already, in terms of its trajectory relative to the education attractor SWM configuration, in the conclusion of Section C-3.3. The 'Āhuarangi Climate' Unit though deserves additional attention. Anita acknowledged the challenge that the school's student choice model poses to the holistic intent of the course. Nevertheless, with the possible exception of Rebecca's 'Te Ara-year 12' (Section 5.3.10), of the nine metacurriculum units outlined in this chapter, 'Āhuarangi Climate' with its three collaborating teachers range of contributing learning areas, comes closest to being a comprehensive albeit small-scale intimation of what a Sustainable Wellbeing Metacurriculum programme for year 11 might look like if it could be made mandatory to attend the whole course and were to be extended school-wide to involve all teachers in all learning areas.

## 5.3.9 Nicola—Self-Watering Planter Boxes

When teaching this project-based Unit Nicola—like Deb who provided the 'Harsh Summer' Unit—was working at one of the two largest and lowest decile Study-Unit schools with a relatively large non-European/Pākehā student roll. The collegial environment was strongly subject-siloed with no school-wide support for the cross-curricular, sustainability and wellbeing approach she was prioritising. At the time she participated in this research, she had resigned from her position after seven years at the school and was completing a Master's degree in Sustainable Management. Nicola described her 'Self-Watering Planter Boxes' project as follows:

> In the Head, Heart, Hand model of EfS at NCEA Level 2 and 3 and NCEA Level 1 Science, we have developed student-led projects that involve them engaging with local issues within the school or community and taking action for a sustainable future. For example, many of our students belong to communities where Type 2 Diabetes is a real-life issue for many family members both young and old (we have high numbers of Pacifika and Asian students). Having looked at the science and statistics this is identified as an issue that students can take action on. The action is to work with landscaping students at a [tertiary] college in their community to build planter boxes to grow vegetables which are then used to cook and eat healthy meals that are appealing to family members. Students then take personal

action such as building planters and growing food for their own families in the backyard or community gardens and educating their community about the risks associated with diabetes and ways to reduce the risk. Some students have also started walking groups or contributed to community gardening groups to increase exercise to mitigate the health risks.

Where does Nicola's school lie in terms of its trajectory relative to the education attractor SWM configuration? According to its website, the school "nurtures a culture of excellence through whānaungatanga[7], manaakitanga[8] and kairangitanga[9]". These are values that accord with those of the SWM framework domains of Social Justice although the emphasis here is on "a culture of excellence" rather than Ecosphere awareness or Cultural critique and future focus. Nicola certainly valued the development of student agency through her commitment to hands-on projects outside of the classroom and also team teaching (with collaborators external to the school) to support her students' academic engagement and success. It seems fostering student agency and team teaching was less of a priority for the school as a whole. Academic attainment is important for this school and its traditional SBS pedagogy succeeds for the majority of its students as can be seen from its NCEA results for 2022 shown in Table 6-13. The school was prepared to support the Education for Sustainability goals and cross-curricular activities of Nicola's 'Self-Watering Planter Boxes' Unit primarily because it enabled students to succeed who were otherwise not expected to gain NCEA level 1.

### 5.3.10 Rebecca et al.—Te Ara-year 12

'Te Ara' is the name given at Rebecca's school to a timetabled programme of lessons for students at all year levels from 7 to 13. The years 7 to 10 classes have one 50-minute period a week. The senior classes all have two periods a week, totalling around 110 minutes or 6.7% of their timetabled lessons. This programme is one of three weekly designated CCH activities in the overall timetable along with Hui time and Assemblies. Together the three activities comprise 10% of the year 12 weekly timetable (2.8 hours) in total.

In Te Reo Māori 'Ara' translates to English in several ways. As a verb, it means to arise, to awake, or As a noun, it can mean, a way, path, lane, passageway, track, course, or route; and also the breaking of the waters in childbirth (Moorfield, 2003). Before 2022 (at the time of the first and second rounds of the Delphi survey), the Te Ara programme was known as 'Global Living'. References to the 'Global Living in the following text are taken from those earlier rounds of the study.

Table 5-6 shows the timetable within which the 'Te Ara-Year 12' project runs, colour-coded for the three lesson type categories CCH (green), SBS (violet), and pastoral/whanau time (blue). The Te Ara lessons for years 11 to 13 students including 'Te Ara-Year 12' are shown with a green diagonal striped pattern. The school runs a 10-day timetable cycle (week A and week B) to allow all seniors to have a double period in each learning area once a fortnight (on Tuesdays and Thursdays).

[7] relationship, kinship, sense of family connection
[8] hospitality, kindness, generosity, support - the process of showing respect, generosity and care for others.
[9] excellence.

*Table 5-6 The ten-day timetable at Rebecca's school showing CCH (sustainability and wellbeing-oriented) lessons in green, SBS in violet, and pastoral in blue. The 'Te Ara-Year 12' project lesson times are shown with the green diagonal stripe pattern.*

**Week A**

| Rāhina | Rātu | Rāapa | Rāpare | Rāmere |
|---|---|---|---|---|
| Whanau Time 08:50-09:00 | Staff briefing 8:30, Whanau Time, Form Seniors 08:50-09:00 | P1 08:50-09:40 | Whanau Time 08:50-09:00 | Staff waiata & briefing 8:25, Whanau Time 08:50-09:00 |
| P1 09:00-10:00 | P1 09:00-10:00 | P2 09:40-10:30 | P1 09:00-10:00 | P1 09:00-10:00 |
| P2 10:00-10:55 | P2 10:00-10:55 | Break 10:30-10:45 | P2 10:00-10:55 | P2 10:00-10:55 |
| Break 10:55-11:15 | Break 10:55-11:15 | **P3: Te Ara (11-13) 10:45-11:40** | Break 10:55-11:15 | Break 10:55-11:15 |
| P3 11:15-12:15 | P3 11:15-12:10 | P4 11:40-12:35 | P3 11:15-12:10 | P3 11:15-12:15 |
| P4 12:15-13:15 | P4 12:10-13:05 | Hui Time 12:35-13:05 | P4 12:10-13:05 | P4 12:15-13:15 |
| Break 13:15-13:55 | Break 13:05-13:40 | Break 13:05-13:35 | Break 13:05-13:40 | Break 13:15-13:55 |
| Chapel 13:55-14:20 | P5 13:40-14:30 | P5 13:35-14:30 | **P5: Te Ara (11-13) 13:40-14:30** | Assembly 13:55-14:20 |
| P5 14:20-15:20 | P6 14:30-15:20 | P6 :Te Ara (7-10) 14:30-15:20 | P6 14:30-15:20 | P5 14:20-15:20 |

**Week B**

| Rāhina | Rātu | Rāapa | Rāpare | Rāmere |
|---|---|---|---|---|
| Whanau Time 08:50-09:00 | Staff briefing 8:30, Whanau Time, Form Seniors 08:50-09:00 | **P1: Te Ara (11-13) 08:50-09:40** | Whanau Time 08:50-09:00 | Staff waiata & briefing 8:25, Whanau Time 08:50-09:00 |
| P1 09:00-10:00 | P1 09:00-10:00 | P2 09:40-10:30 | P1 09:00-10:00 | P1 09:00-10:00 |
| P2 10:00-10:55 | P2 10:00-10:55 | Break 10:30-10:45 | P2 10:00-10:55 | P2 10:00-10:55 |
| Break 10:55-11:15 | Break 10:55-11:15 | P3 10:45-11:40 | Break 10:55-11:15 | Break 10:55-11:15 |
| P3 11:15-12:15 | P3 11:15-12:10 | P4 11:40-12:35 | P3 11:15-12:10 | **P3: Te Ara (11-13) 11:15-12:15** |
| P4 12:15-13:15 | P4 12:10-13:05 | Hui Time 12:35-13:05 | P4 12:10-13:05 | P4 12:15-13:15 |
| Break 13:15-13:55 | Break 13:05-13:40 | Break 13:05-13:35 | Break 13:05-13:40 | Break 13:15-13:55 |
| Chapel 13:55-14:20 | P5 13:40-14:30 | P5 13:35-14:30 | P5 13:40-14:30 | Assembly 13:55-14:20 |
| P5 14:20-15:20 | P6 14:30-15:20 | P6 :Te Ara (7-10) 14:30-15:20 | P6 14:30-15:20 | P5 14:20-15:20 |

Where does Rebecca's school lie in terms of its trajectory relative to the education attractor SWM configuration? The school's commitment to Sustainability and Wellbeing is demonstrated both through its curriculum, in that its Te Ara programme is mandatory for all students at all levels, and through its school-wide campus practices and management which include comprehensive waste minimisation, school gardens which provide fresh produce for the cafeteria and a tree nursery for restoration and conservation projects. Cross-curricular and team teaching are well-established pedagogical practices at the school. Traditional SBS lessons occupy 90% of the timetable, well above the 60% proportion suggested by the SWM framework proposal, but the school is considering reducing this share in favour of expanding the CCH Te Ara programme. It was not clear to what extent the SBS and CCH Te Ara programmes were coordinated to prioritise Sustainable wellbeing, cross-reference content, avoid duplication of assessment evidence, and take advantage of potential synergies between the two pedagogical modes. 'Te Ara-year 12' in 2022 was taught by teachers from the Visual Arts, Social Science and Language learning areas. Student agency is fostered by encouraging the students to take on significant leadership roles and responsibilities at all ages, especially in the senior school. The 'My Mahi' learning and self-assessment portfolio also develops students' agency in their academic work. The school attains a high level of success in NCEA qualifications as shown in Table 6-13 "The eight Principal Component Analysis (PCA) Case Study schools …". Rebecca's school comes closest of the nine Core study schools to being an exemplar of the emerging SWM, although its private school tuition fees of $27,400 per student (and an additional $16,900 for boarders) means access to this education is limited for the majority of New Zealand students.

### 5.3.11 Brent—Years 9-10 Innovation Stream Curriculum

Brent is an Associate Principal at a large urban mainstream secondary school that has a cross-curricular programme for years 9 and 10 students established in 2017 called the 'Innovation Stream'. Brent could not provide a Unit outline for a Sustainable Wellbeing course designed for year 11 to 13 students, however, he agreed to an interview during which he provided extremely useful insights into why extending the Innovation Stream Curriculum (ISC) beyond year 10 in his school has proven problematic.

I asked Brent, given that the premise of this study is that we need a transformation of education in years 11 to 13 with a future focus on sustainability, "what do you think about the urgency of this transformation?". He listed his three priorities in descending order as: overcoming subject siloes, putting capabilities before content, and addressing "sustainability and social stuff", albeit he saw these latter issues as possibly included with capabilities. He said:

> I think, it's hugely urgent that we continue to transform education and get out of siloed textbooks, and, 'learn this for the test'. That was one of the first things that I noticed coming in here. I went to speak to the cross-curricular kids, what are you learning? They would be passionately babbling about their projects and the capabilities and, you know, just really excited and I'd go to the mainstream classes, and they'd say, I'm learning stats for the test in three week's time. … So that's huge, to make that shift is priority number one. And then you have to make that shift that I talked about in terms of capabilities, [that] being at the core of what we do is probably priority number two. Content, I mean, it's in our pocket on a phone. We don't need content, we need these really core skills. And, yeah, sustainability and social stuff. …, I guess that really falls into those capabilities. It's on the border of values and capabilities, isn't it?

In the first Delphi Survey round of March 2021, Brent stressed the importance for him, of his school's cross-curricular programme. He wrote:

> We already have a programme established that is cross-curricular and we have a strong emphasis on developing students' capabilities. We have a strong environmental council at the school. We have a strong culture of self-review and looking for ways to improve outcomes for students.

The cross-curricular programme he refers to in this quote is the school's 'Innovation Stream' for year 9 and 10 students.

Where does Brent's school lie in terms of its proximity and direction of travel relative to the education attractor SWM configuration? The school's vision stated on its website is "inspiring a community of passionate learners". The words "Sustainability" and "environmental" do not appear prominently on its website although the school has an Enviroschools self-assessed 'Green-Gold' award. Community connection and service are important aspects of the school's stated values. Multiculturalism does not appear to be a high priority. Brent prioritised student capabilities over curriculum content and saw "sustainability and social stuff" as "on the border of values and capabilities, isn't it?" The school's approach to the explicit teaching of capabilities within their ISC could inform further development of the SWM framework inter and intra-personal competency domains. He expressed great enthusiasm for the school's ISC which involves a minority group of year 9 and 10 students in a structured cross-curricular project-based programme but expressed frustration at the constraints that have prevented the ISC being extended successfully beyond year 10. These constraints include university entrance subject requirements; as well as parental and student expectations around academic success and the availability of a wide range of subject options. Some constraints may, however, be the result of inflexible assumptions the school leaders are making about how cross-curricular timetabling, teacher collaboration, NCEA qualifications and the domains of Sustainable Wellbeing in the senior school should follow the existing year 9-10 model. Brent saw the school's ISC as having significantly increased both students' engagement and agency in their learning, and teachers' effectiveness through the opportunities for collaboration it provides. The process through which the school introduced the ISC to the teaching staff and school community demonstrates how important strong leadership is for overcoming conventional mindsets and bringing about visionary system change in mainstream secondary schools.

### 5.3.12 Section Summary

This section has presented case study vignettes exploring the Core Participants' perspectives on their SWM Units, educational intentions, and the school contexts within which each is or was working. The participants' school situations are diverse and demonstrate varying degrees of commitment to the ideal of centring Sustainable Wellbeing in their school practices and curriculum. Factors that appear relevant to the 'SWM Attractor' analogy include;

- alignment between the SWM framework Goals and each school's stated values;
- support for student agency; the strength of teacher leadership and collaboration—particularly team teaching;
- the balance between CCH and SBS teaching;
- the range of learning areas connected to the range of SWM subdomains;
- the role of NCEA and other accreditation alternatives;
- campus environmental sustainability practices and projects;

- relationships with community organisations and parents;
- and cultural inclusivity.

The following section details and compares the Sustainable Wellbeing Metacurriculum Goals adopted by the teachers of each of the eight completed SWM Units, and how they linked them to NZC Achievement Objectives, NCEA standards, and portfolio Assessment approaches.

## 5.4 SWM Unit Goals, NZC Achievement Objectives, and NCEA Standards

### 5.4.1 Section Overview

In this section, I show in detail how the nine Units introduced in Section 5.2, were linked by teachers to SWM Sustainable Wellbeing Subdomain Goals, NZC Achievement Objectives, and NCEA standards. The Sustainable Wellbeing Subdomain Goals enable teachers to define their Unit planning across the multiple interwoven aspects of Sustainable Wellbeing in a consistent, coherent, comprehensive, and connected way unique to their local context, school values, and educational vision. The NZC achievement objectives and NCEA assessment standards associated with each Unit connect it to New Zealand's existing curriculum and formal assessment frameworks which are the focus of my second research subquestion: What links can be established between the meta-concept of 'Sustainable Wellbeing', the New Zealand Curriculum learning areas, and NCEA standards or other appropriate school-leaver qualifications?

The third round of the Delphi Survey was in essence an SWM Unit planning template organised under four main headings with subheadings as follows.

1. Introduction:
   1.1. Review the SWM framework structure.
   1.2. Define Unit Title, timetabling hours, student year levels, and general context statement.
2. Sustainable Wellbeing Goals(SWG)
   2.1. SWM Subdomain Goals—Anchor and Connected
   2.2. Place & Context-Based Goals—for Anchor and Connected subdomains
   2.3. United Nations Sustainable Development Goals (SDG)
   2.4. Sustainable Wellbeing Competencies at the Inter and Intra personal levels
3. NZC Achievement Objectives Links
4. NCEA standards Assessment
   4.1. Existing Standard links
   4.2. Teachers' views on the NCEA Review of Achievement Standards and alternative forms of assessment for the SWM

Under the survey Introduction heading 1., the teachers had the option to review the SWM domains and subdomains framework that they had co-constructed, as shown in Section 4.5.1, Table 4-10. The nine Unit Titles, timetabling, and general context details—that participants offered in response to the questions under subheading 1.2—have been presented already in Section 5.3.1.

The phrase 'Sustainable Wellbeing Goals' (SWG) in heading 2 above, refers to any of the four types of teaching and learning goals included under subheadings 2.1 to 2.3. All are explicitly related to the SWM framework of Domains and Subdomains first introduced in Table 4-7 and Table 4-10. The 'Place & Context-Based Goals' and 'United Nations' Sustainable Development Goals (SDG)' are collectively

referred to as the Supplementary Unit Goals'. The Sustainable Wellbeing Competencies at the Inter and Intra personal levels of Section 5.4.2.2 are listed in full in Appendix B-2.

In Section 5.4.2, the SWM Anchoring and Connected, Domains, Subdomains and SWG choices for the nine SWM Units are compared side by side. The details of the NZC Achievement Objectives and NCEA standards—where these elements were provided by teachers—are compared for the nine units in Appendices C-5 and C-6.

Table 5-7 shows which of the framework items were defined for each of the nine SWM Units. Mathew, Anita, Tara, Deb, and Daniel defined Specific NZC Achievement Objectives and or NCEA standards for their six Units and these are listed for each Unit by level and learning area in Appendix C-7. Section 5.4.3 presents the main findings relevant to my second research subquestion from the analysis of this data.

*Table 5-7 Unit Outline items defined for each of the Nine Sustainable Wellbeing Metacurriculum Units*

| Teacher | Unit Title | **SWM Framework Elements** | SWM Anchor and Connected Subdomain Goals | Place & Context-Based Goals (PCBG) | United Nations Sustainable Development Goals (SDG) | Competencies (SWG) at the Inter and Intra personal levels | NZC Achievement Objectives Links | NCEA standards Assessment | Views on NCEA and alternative forms of assessment for the SWM |
|---|---|---|---|---|---|---|---|---|---|
| *The three Teacher-Framed SBS Courses* | | | | | | | | | |
| Mathew | **Business Studies-Level 2 [EC]** | | | | | | | | |
| Anita | **Education for Sustainability [SS]** | | | | | | | | |
| Claire | **Working Title [CS]** | | | | | | | | |
| *The three Teacher-Framed CCH Projects* | | | | | | | | | |
| Tara | **AGE Adventure [ES]** | | | | | | | | |
| Deb | **Harsh Summer [EE]** | | | | | | | | |
| Daniel | **Urban Farming Outreach [ES]** | | | | | | | | |
| *The three Researcher-Framed CCH Projects* | | | | | | | | | |
| Anita | **Āhuarangi Climate [EC]** | | | | | | | | |
| Nicola | **Self-Watering Planter Boxes [ES]** | | | | | | | | |
| Rebecca | **Te Ara-Year 12 [CS]** | | | | | | | | |

## 5.4.2 SWM Unit Sustainable Wellbeing Goals

### *5.4.2.1 SWM Anchor and Connected Subdomain Goals*

The Domain and Subdomains of the SWM framework, introduced in Table 4-10 are expanded in Table 5-8 to show the Subdomain Goals—three or four per subdomain—that were derived from participants' suggestions in the second Delphi round. Table 5-8 also shows the Anchoring and Connected Subdomain Goals defined for each of the nine SWM Units. Claire only got as far as defining the Anchoring Subdomain for her Unit 'Working Title' as 'Others' cultures and World views'. The Anchor and Connected Subdomain Goals selected for this Unit are based on her comments in earlier rounds of the study as presented in Appendix C-3.4.

As shown in Table 5-2 at the outset of this chapter, six of the nine SWM Units provided by Core Participant teachers are anchored in the Ecosphere Domain, two in Cultural Vision and just one in the Social Justice Domain. Three of the Units are anchored in the 'Regenerative-Cultivators' subdomain. This bias toward the Ecosphere subdomains is not apparent in the Units' Connected Subdomains however where the distribution is more even across domains. The overall ratios were 12:17:12 for the number of Connecting subdomains selected in the Ecosphere, Social Justice, and Cultural-Vision domains respectively and 20:22:24, for the total number of Connected Sustainable Wellbeing Goals (SWG). The most frequently referenced Subdomains were, in descending order, 'Whanau and Community', 'Maker-Recyclers' and 'Our Cultural Inheritance'. These three subdomains represent all three primary domains but interestingly, and perhaps not coincidentally, the Ecosphere is the secondary fractal domain of all three. Social Justice was the most frequently selected Connected Domain. Where a Unit had only one Connected Domain, it was Social Justice and all nine Units identified the Social Justice Subdomain 'Whanau and Community' as a Connected Subdomain.

Across the nine Subdomains, there was a total of thirty Subdomain Goals available for teachers to associate with their SWM Units. The frequency of Subdomain Goals selected naturally reflects the frequency of the subdomains selected. The most frequently selected Anchoring Subdomain Goal was the 'Regenerative-Cultivators'—"ES1-Develop cooperative, hands-on cultivation and eco-friendly sustainable resource management skills using low or high-tech methods as appropriate: For example, through participation in an ongoing school or community garden, or farm." The most frequently selected Connected Subdomain Goal was the 'Whanau and Community' SWG—"SE3–Understand how wellbeing relates to the harmony of physical, social, mental, emotional and spiritual elements in life as described for instance, by Durie's Te Whare Tapa Wha model (Durie, 2009) and the alignment between Te Whare Tapa Wha and the SWM.".

Only two of the thirty Subdomain Goals were not selected as relevant to any of the nine SWM Units. They were the 'Equity, Rights and Responsibilities'—"SS1-Develop critical thinking, evaluative, and communication skills to discover, participate in and contribute to respectful, empowering, sustainable, evidence-based, fair and fact-checked information networks; in face-to-face, online, and all formal and informal media arenas."; and the 'Cultural Evolution and Individual Agency' SWG—CC3 "Investigate human challenges and envision possibilities in a world of ever-increasing technological sophistication ….". One other Subdomain Goal, was selected for one Researcher-framed Unit only; i.e. the 'Other Cultures and World Views'—"CS2-Understand the benefits of multiculturalism and its vulnerability to extremism. Work to experience the former and mitigate the latter through inclusion, dialogue, and cultural exchange." Given that fifteen of the teachers who contributed to the co-construction of these Subdomain Goals did not then proceed to provide exemplar SWM Units, a utilisation of twenty-seven out of thirty proposed Subdomain Goals represents an encouraging degree of consensus and diversity within that consensus.

*Table 5-8 A comparative matrix of the Sustainable Wellbeing Metacurriculum Subdomain Goals selected for each of the Nine SWM Units. Goals in the Anchoring Subdomain of each Unit are identified with the Anchor icon while the Connecting Subdomains Goals are identified with the 5-node network icon.*

| **Domain**<br>**Subdomain**<br>**Sustainable Wellbeing Goals (SWG)** | **Mathew** Business Studies-Level 2 [EC] | **Anita**– Education for Sustainability [SS] | **Claire**–Working Title [CS] | **Tara**–AGE Adventure [ES] | **Deb**– Harsh Summer [EE] | **Daniel**– Urban Farming Outreach [ES] | **Anita et al.**– Āhuarangi Climate [EC] | **Nicola**– Self-Watering Planter Boxes [ES] | **Rebecca**–Te Ara-Year 12 [CS] |
|---|---|---|---|---|---|---|---|---|---|
| **Ecosphere—E**<br>Humanity's relationship with its planetary, ecological, and built environment. | | | | | | | | | |
| **Maker-Recyclers—EE** are responsible for evolving human-built and physically modified environments [in ways that harmonise with and sustain the earth].<br>Number of Units Anchored=1, Connected = 6. Total SWG, Anchoring=1, Connected=10 | | | | | | | | | |
| EE1–Explore, share, and build energy use reduction, efficiency, and renewable generation solutions in your school and community. | |  | | | | |  | | |
| EE2–Explore, Share, and develop the skills to imagine, design, and build sustainable technologies including, Eco-housing/cities, Eco-transport, Eco-clothing and Eco-communication infrastructure for Aotearoa New Zealand. | | | |  |  |  |  |  |  |
| EE3–Understand the concept of circular economy and its climate-biodiversity basis, and collaborate to practise and develop zero-emissions and zero-waste technologies in your school and community. | | | | | |  |  | |  |
| **Regenerative-Cultivators—ES** manage human-occupied land and water ecosystems for human sustenance in ways that improve their wellbeing [and ours].<br>Number of Units, Anchored=3, Connected = 2. Total SWG, Anchoring=6, Connected=3 | | | | | | | | | |
| ES1–Develop cooperative, hands-on cultivation and eco-friendly sustainable resource management skills using low or high-tech methods as appropriate: For example, through participation in an ongoing school or community garden, or farm. | | | |  | |  |  |  |  |

| Domain / Subdomain / Sustainable Wellbeing Goals (SWG) | **Mathew** Business Studies-Level 2 [EC] | **Anita**– Education for Sustainability [SS] | **Claire**–Working Title [CS] | **Tara**–AGE Adventure [ES] | **Deb**– Harsh Summer [EE] | **Daniel**– Urban Farming Outreach [ES] | **Anita et al.**– Āhuarangi Climate [EC] | **Nicola**– Self-Watering Planter Boxes [ES] | **Rebecca**–Te Ara-Year 12 [CS] |
|---|---|---|---|---|---|---|---|---|---|
| ES2–Understand the climate-environmental necessity for sustainable resources management principles and participate in the regeneration of an abundant cultivated, ecosystem: For example; Fisheries, Aquaculture, Agriculture, Horticulture, Forestry, etc. | | | | ⚓ | | | | | ✱ |
| ES3–Understand, share, and explore through both education outside the classroom and technology, our ecologically dependent place in the inter-species web of life across all scales from local to global. | | | | ⚓ | | ⚓ | | | |
| **Kaitiaki Guardians—EC** look out toward, explore, and seek alignment with more than human nature. They are conscious of being part of nature and of our duty of care toward and need of respect for it. Number of Units, Anchored=2, Connected = 4. Total SWG, Anchoring=2, Connected=7 | | | | | | | | | |
| EC1–Understand the extent and significance of biodiversity loss for the planet and human existence, and participate in the re-wilding of local ecosystems. | | | | ✱ | | ✱ | | | ✱ |
| EC2–Understand the long history of Earth's evolution and explore our relationship to wild ecosystems through observational and survival skills education outside the classroom. | | | | | | ✱ | | ✱ | |
| EC3–Understand the physical and anthropogenic basis and implications of climate change; share personal emotional responses and challenges; and investigate local, national, and global opportunities for mitigation and adaptation including the attainment of carbon neutrality goals in your school. | ⚓ | | | ✱ | | ✱ | ⚓ | | |
| **Social Justice—S** Humanity's relationship with its community, social, and political world. | | | | | | | | | |
| **Whanau and Community—SE** is concerned with respectful, face-to-face relationships of mutual physical, emotional, [mental] and intergenerational support. Number of Units Anchored=0, Connected = 9. Total SWG, Anchoring=0, Connected=19 | | | | | | | | | |

| Domain / Subdomain / Sustainable Wellbeing Goals (SWG) | **Mathew** Business Studies-Level 2 [EC] | **Anita**– Education for Sustainability [SS] | **Claire**–Working Title [CS] | **Tara**–AGE Adventure [ES] | **Deb**– Harsh Summer [EE] | **Daniel**– Urban Farming Outreach [ES] | **Anita et al.**– Āhuarangi Climate [EC] | **Nicola**– Self-Watering Planter Boxes [ES] | **Rebecca**–Te Ara-Year 12 [CS] |
|---|---|---|---|---|---|---|---|---|---|
| SE1–Investigate the relationship of community cohesion, gender equality, and income distribution to climate change resilience and collective environmental impact, at the local community and regional levels. | | |  | | |  | | | |
| SE2–Practise manaakitanga and connect with the local community to improve community cohesion by addressing social issues, like social isolation, and malnutrition. | | |  | | |  |  |  |  |
| SE3–Understand how wellbeing relates to the harmony of physical, social, mental, emotional and spiritual elements in life as described for instance, by Durie's Te Whare Tapa Wha model (Durie, 2009) and the alignment between Te Whare Tapa Wha and the SWM. |  |  |  |  |  |  |  | |  |
| SE4–Understand what respectful interpersonal relationships look like, and apply this learning in your face-to-face and online relationships. | | |  |  | |  |  | | |
| **Equity, Rights, and Responsibilities—SS** is concerned with equity, balance, [rhythm and reciprocity]. The collective strength and awareness, of mutual wellbeing within and between communities and nations. Number of Units, Anchored=1, Connected = 4. Total SWG, Anchoring=1, Connected=5 | | | | | | | | | |
| SS1–Develop critical thinking, evaluative, and communication skills to discover, participate in and contribute to respectful, empowering, sustainable, evidence-based, fair and fact-checked information networks; in face-to-face, online, and all formal and informal media arenas. | | | | | | | | | |
| SS2–Discuss the meanings of and connections among the concepts of rights and responsibilities, social justice and injustice, equity and inequity, citizenship and self-interest. Investigate how these ideas apply within your school, local government, nation and among nations; and how they relate to environmental wellbeing and climate change mitigation and adaptation. | |  | | | |  |  | |  |

| Domain / Subdomain / Sustainable Wellbeing Goals (SWG) | **Mathew** Business Studies-Level 2 [EC] | **Anita**– Education for Sustainability [SS] | **Claire**–Working Title [CS] | **Tara**–AGE Adventure [ES] | **Deb**– Harsh Summer [EE] | **Daniel**– Urban Farming Outreach [ES] | **Anita et al.**– Āhuarangi Climate [EC] | **Nicola**– Self-Watering Planter Boxes [ES] | **Rebecca**–Te Ara-Year 12 [CS] |
|---|---|---|---|---|---|---|---|---|---|
| SS3–Investigate how poverty, extreme income disparities, Injustice, and conflict affect collective wellbeing and the natural environment and how they can be mitigated through give-and-take social and legal structures and processes. Apply your findings to Aotearoa New Zealand and your community. |  | | | | |  | | | |
| **Power and Influence—SC** deals with humanity's struggle to avoid catastrophic conflict and govern itself for the collective determination of an ecologically sustainable world order extending to mutually beneficial relationships with all other species. Number of Units, Anchored=0, Connected = 4. Total SWG, Anchoring=0, Connected=8 | | | | | | | | | |
| SC1–Demonstrate effective leadership and collaboration toward the attainment of sustainable wellbeing goals in your school, including contributing to the ongoing development of the SW Metacurriculum. | | | | | |  | | |  |
| SC2–Understand existing economic and financial systems including the distinction between growth and direction in economics and its relevance to biodiversity loss, climate change mitigation and adaptation, and a future of sustainable wellbeing. |  | | | | |  |  | | |
| SC3–Understand political systems and ways of developing political agency and influence including, active listening, vision building, persuasive campaigning, print and digital media literacy, voting, activism, and lobbying. | | | | | |  |  | |  |
| **Cultural Vision—C** Humanity's relationship with its cultural histories, its present, and its future. | | | | | | | | | |
| **Our Cultural Inheritance—CE** seeks to learn crucial lessons from the triumphs and tragedies of our own culture's past, for the sustainable wellbeing of future generations. Number of Units Anchored=0, Connected = 5. Total SWG, Anchoring=0, Connected=12 | | | | | | | | | |
| CE1–Examine and Critique unconscious judgments, and premises, in Our Cultural Inheritance(s) including those of established disciplines, which have led to our current sustainable wellbeing challenges and affect our ability to respond effectively to those challenges. |  | | | | |  |  | |  |

| Domain / Subdomain / Sustainable Wellbeing Goals (SWG) | **Mathew** Business Studies-Level 2 [EC] | **Anita**– Education for Sustainability [SS] | **Claire**–Working Title [CS] | **Tara**–AGE Adventure [ES] | **Deb**– Harsh Summer [EE] | **Daniel**– Urban Farming Outreach [ES] | **Anita et al.**– Āhuarangi Climate [EC] | **Nicola**– Self-Watering Planter Boxes [ES] | **Rebecca**–Te Ara-Year 12 [CS] |
|---|---|---|---|---|---|---|---|---|---|
| CE2–Understand and debate the benefits and costs of trade and technology, in light of the contemporary challenges of polluting waste streams, biodiversity loss and climate change. Investigate Who benefits, Who does not benefit, and Who suffers? | | | | | |  | | |  |
| CE3–Understand and experience in marae settings (preferably), key concepts of Mātauranga Māori such as wairua, whakapapa and turangawaewae and relate them to sustainability and wellbeing concepts from settler traditions. | | |  | | | |  | |  |
| CE4–Understand the presettlement and entwined postsettlement histories of tangata whenua and tangata tiriti, and how they relate to the contemporary challenges of biodiversity loss and climate change in Aotearoa New Zealand. | | |  | | |  |  | | |
| **Other Cultures and World Views—CS** cultivates an appreciation for the diversity of world views in our time. It investigates how cultures can be more or less well adapted to their social and natural environments, and whether any worldview can ever be final. Number of Units Anchored=2, Connected = 3. Total SWG, Anchoring=4, Connected=5 | | | | | | | | | |
| CS1–Demonstrate an appreciation of other perspectives on the human condition including how your perspective appears to others and consider whether a universal, objective, and correct perspective is possible. | |  |  | | |  |  | |  |
| CS2–Understand the benefits of multiculturalism and its vulnerability to extremism. Work to experience the former and mitigate the latter through inclusion, dialogue, and cultural exchange. | | | | | | | | |  |
| CS3–Understand the interconnectedness of geography, ethnicities, religions, nations, and social movements in human evolution and the history of civilization which has led to our current pollution, climate and biodiversity crisis. | | | | | |  |  | |  |

| Domain<br>Subdomain<br>Sustainable Wellbeing Goals (SWG) | | **Mathew** Business Studies-Level 2 [EC] | **Anita**– Education for Sustainability [SS] | **Claire**–Working Title [CS] | **Tara**–AGE Adventure [ES] | **Deb**– Harsh Summer [EE] | **Daniel**– Urban Farming Outreach [ES] | **Anita et al.**– Āhuarangi Climate [EC] | **Nicola**– Self-Watering Planter Boxes [ES] | **Rebecca**–Te Ara-Year 12 [CS] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Cultural Evolution and Individual Agency—CC** | is about the power of the individual to influence history and societies' need to nurture individual [creativity]. It is about new visions of, and paths toward, a Sustainable Wellbeing future for the planet and humanity.<br>Number of Units Anchored=0, Connected = 4. Total SWG, Anchoring=0 Connected=7 | | | | | | | | | |
| CC1–Explore and navigate personal, social and cultural identities (e.g. urban vs. rural, LGBTQ+, generational, etc.) and how they relate to futures of sustainable wellbeing. | | | | | | |  | | | |
| CC2–Imagine, design and Innovate for a unified ecologically conscious world culture that celebrates diversity and is centred on achieving sustainable planetary wellbeing by facing our changing climate, and social, and cultural challenges. | | | | |  | |  |  | |  |
| CC3–Investigate human challenges and envision possibilities in a world of ever-increasing technological sophistication. Investigation possibilities include the implications for the meaning of freedom, free speech, self-determination, privacy, the practice of mindfulness, creativity, and problem-solving, including pollution, biodiversity loss, and climate change. | | | | | | | | | | |
| CC4–Understand the power of individuals to influence the course of history and the role of societies in fostering the unique gifts of all their members. Explore and express your aspirations and dreams according to your vision of our collective future. | | | | | | |  | | |  |

As an additional check that the Subdomain Goals were relevant and useful, the round 3 Delphi Survey asked teachers to Agree or not, with the following statement about the Anchoring Subdomain Goals they chose: “This (these) Subdomain Goal accurately describe(s) key aspects of what I want students to achieve in this Unit”. As shown in Table 5-9, three of the five teachers that completed the Survey ‘Somewhat Agreed’, one ‘Somewhat disagreed’ and one, ‘Strongly Agreed’. Table 5-9 also summarises the number of Connected SWM Domains and Subdomains and the number of Anchor and Connected Subdomain Goals defined for each of the nine SWM Units. While each Unit could have only one Anchoring Subdomain, the number of connected Subdomains was up to the individual teacher and their educational goals. The median number of Connected Subdomains was four per Unit but varied from one to eight. This variability reflects in part the intended duration of each Unit. Anita et al.’s Āhuarangi Climate, for example, covers all eight available Connected Subdomains over a full-year course of six periods per week.

The number of Connected Domains and Subdomains also reflects the intended CCH breadth of the Unit. Daniel’s ‘Urban Farming Outreach’ is only 65 hours in total duration but has eight Connected Subdomains because he combines a general high-level exploration of the concept of Sustainability and its implications with a specialised vocational focus on Apiculture and Horticultural skills. Deb’s ‘Harsh Summer’ by contrast has just one Connected Subdomain and is both relatively short (30 hours) and focused on relating just two subdomains of Sustainable Wellbeing. A similar level of variability is evident in the number of Subdomain Goals—both Anchoring and Connected—defined for each Unit. This finding raises the question of how thoroughly these goals were intended to be explored and whether or not student achievement of all goals was to be assessed. Although Deb selected only two Subdomain Goals, she was the only one of the five Delphi-3 teachers to also provide her own Place-Based Goals complete with additional assessment strategies to supplement NCEA standards.

The third Delphi Survey also asked teachers to respond to the statement “this (these) SWG can be adequately assessed using existing NCEA standards”, for each of the Subdomain Goals they selected. In all, forty-four Anchoring and Connected Subdomain Goals were selected by the five teachers who completed the round three Survey—Mathew, Anita, Tara, Deb, and Daniel. Their responses were largely positive as shown in Table 5-10.

The teachers' judgements about the NCEA assessment of Subdomain Goals seemed, however, to depend more on their knowledge, experience of and possibly also, permission to use the available standards than on the Subdomain Goals themselves. There was no consistent response pattern for any of the selected goals. For instance, all five teachers selected the Whanau and Community Subdomain SWG, ‘SE3-Understand how wellbeing relates to the harmony of physical, social, mental, emotional and spiritual elements in life as described for instance, by Durie's Te Whare Tapa Wha model (Durie, 2009) and the alignment between Te Whare Tapa Wha and the SWM.’ However, their opinions of its assessability using NCEA standards ranged from “Disagree” to “Strongly Agree”.

*Table 5-9 Subdomain Goals User evaluations and NCEA assessability overview. The third column shows the domains from which connected subdomains were chosen (green, red, and blue for Ecosphere, Social Justice, and Cultural Vision respectively). The fourth Column shows the number of connected domains followed by the number of connected subdomains.*

| SWM Unit | Anchor Subdomain | No. Connected SWM Domains, Subdomains | No. Anchor SWGs | The Anchor SWG(s) accurately describe(s) key aspects of what I want students to achieve in this Unit. | No. Connected SWGs |
|---|---|---|---|---|---|
| Mathew–Business Studies-Level 2 [EC] | Kaitiaki Guardians | 2, 4 | 1 | Somewhat Agree | 4 |
| Anita– Education for Sustainability [SS] | Equity, Rights and Responsibilities | 3, 3 | 1 | Somewhat Agree | 3 |
| Claire–Working Title [CS] | Other Cultures and World Views | 2, 2 | 1 | - | 6 |
| Tara–AGE Adventure [ES] | Regenerative-Cultivators | 3, 4 | 3 | Strongly Agree | 6 |
| Deb– Harsh Summer [EE] | Maker-Recyclers | 1, 1 | 1 | Somewhat disagreed | 1 |
| Daniel– Urban Farming Outreach [ES] | Regenerative-Cultivators | 3, 8 | 2 | Somewhat Agree | 22 |
| Anita et al.– Āhuarangi Climate [EC] | Kaitiaki Guardians | 3, 8 | 1 | - | 16 |
| Nicola– Self-Watering Planter Boxes [ES] | Regenerative-Cultivators | 2, 3 | 1 | - | 3 |
| Rebecca–Te Ara-Year 12 [CS] | Other Cultures and World Views | 3, 8 | 3 | - | 15 |

*Table 5-10 Five teachers' responses for a total of 44 goals to the statement "This Sustainable-Wellbeing Goal can be assessed and accredited by, within, or across available NCEA standards".*

| Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 11% | 18% | 68% | 2% |

### *5.4.2.2 SWM Inter and Intra personal Competency Goals*

As explained in Section 3.5.3, the analysis of teachers' suggestions of Sustainable Wellbeing Skills, Competencies, and Dispositions at the Individual-Interpersonal level was to be based on the same principle of self-similar fractal extension applied to the Domains of Individual Action, Feeling, and Thinking, as was applied to the analysis of Knowledge, Issues, and Big Ideas at the Human-Societal level. Whereas this analytical strategy worked well at the latter level, it proved too simplistic for the former. The analysis at the Human-Societal level resulted in nine fractally related subdomains, each with self-explanatory titles that could adequately categorise all suggestions of Knowledge, Issues, and Big Ideas. At the Individual-Interpersonal level, not only did the analysis require one level to become two orientations–i.e. the inter and intra-personal—but the resulting subdomains, while approximately fitting the self-similar fractal pattern, did not suggest readily recognisable personal attribute titles. The most significant Skills, Competencies, and Dispositions could only be categorised as belonging to the 'Integrating Self' attractor itself since they involved all three domains in far more subtle integrations than the fractal conception of Action, Feeling, and Thinking domains could adequately model.

In all, thirty-four SWM subdomains emerged from the analysis of Skills, Competencies, and Dispositions, which I refer to simply as Competencies in the following commentary. Table 5-11 displays these Competency subdomains, organised by the two levels, and then the Integrating Self Attractor Domain and the Domains of Action, Feeling, and Thinking within each level. This theoretical structure should be regarded as provisional only, a convenient way of organising the complex data arising from the survey responses until a more adequate theoretical structure consistent with the SWM framework can be offered.

The 'Total Integrating Self' in Table 5-11 comprises the 'Integrating Self' at both the Inter and Intra personal levels. The concept of 'The Integrating Self' represents the individual spirit, wairua and mana —insofar as I understand these Te reo Māori concepts. In complexity thinking terms, at its core, the 'Total Integrating Self' is the attractor that maintains the integrity of the living being and the coherent interrelatedness of the individual's Domains of Action, Feeling, and Thinking, but it is also a domain in its own right comprising those higher aspects of character such as resilience and perseverance which cannot be associated more with one or another of the Action, Feeling, and Thinking domains but rather emerge from and integrate all three under the influence of the individual Integrating Self.

*Table 5-11 The Sustainable Wellbeing Competencies at the Inter and Intra personal levels prioritised by Tara, Deb and Daniel, as Important for "All or Most", or "Some" of their students to develop in their respective SWM Units: 'AGE Adventure', 'Harsh Summer', and 'Urban Farming Outreach'.*

| | Tara | Deb | Daniel |
|---|---|---|---|
| **Total-Integrating Self; Katoa-Whakakotahi Whaiaro** | | | |
| **Total-Integrating Self Domain** | | | |
| 1. Integrating the inner, social and environmental Self | All or Most | Some | All or Most |
| **Interpersonal level–Family and friends; Taumata whanau** | | | |
| **Interpersonal-Integrating Self Domain** | | | |
| 1. Developing and encouraging others to a wider view of life and Self | All or Most | Some | All or Most |
| 2. Accepting responsibility for and a role in society's fostering of citizens' self-integration | Not a priority | All or Most | All or Most |
| 3. Developing abilities to make significant contributions to the sustainable wellbeing of your community and humankind | All or Most | Some | All or Most |
| 4. Developing confidence in all domains of collaboration and communication to participate positively in your community | All or Most | All or Most | All or Most |
| **Interpersonal-Action Domain** | | | |
| 1. Awareness of and support for the physical wellbeing of others. E.g. Reducing Community carbon footprint. | All or Most | All or Most | All or Most |
| 2. Eco-Trades, resource management and nature conservation skills | Some | Not a priority | Not a priority |
| 3. Developing empathy for the environment through experiences in nature | All or Most | All or Most | All or Most |
| 4. Planning and conducting collaborative Sustainable Wellbeing projects | All or Most | All or Most | All or Most |
| **Interpersonal-Feeling Domain** | | | |
| 1. Socio-emotional engagement, perspective, and learning | All or Most | All or Most | All or Most |
| 2. Ability to express and control the expression of Interpersonal feelings | All or Most | Some | All or Most |
| 3. Developing Interpersonal Empathy | All or Most | All or Most | All or Most |
| 4. Ability to understand, communicate and problem-solve in relationships | All or Most | All or Most | All or Most |

| | Tara | Deb | Daniel |
|---|---|---|---|
| **Interpersonal-Thinking Domain** | | | |
| 1. Building shared understandings. Articulate communication | Some | Some | All or Most |
| 2. Thinking toward applying problem-solving skills, in working with others | All or Most | All or Most | All or Most |
| 3. Thinking toward relationship building with others and nature | All or Most | Some | All or Most |
| 4. Critical, strategic, visionary thinking for collaborative undertakings | Some | Some | All or Most |

## Individual-Intrapersonal level, taumata takitahi

| | | | |
|---|---|---|---|
| **Intrapersonal-Integrating Self Domain** | | | |
| 1. Developing the ability to reflect on your sustainable living and wellbeing | All or Most | Some | All or Most |
| 2. Developing self-discipline, good judgement and taking responsibility for yourself | All or Most | All or Most | All or Most |
| 3. Developing agency and confidence in your abilities and resilience. | All or Most | Some | All or Most |
| 4. Developing flexibility and responsiveness in action, feeling, thinking and relationships | All or Most | Some | All or Most |
| 5. Developing the ability to determine your direction on the path of learning | All or Most | Some | All or Most |
| **Intrapersonal-Action Domain** | | | |
| 1. Meta-Action: Developing Self-Awareness in doing and not doing | All or Most | Some | Some |
| 2. Fine and gross motor skills, strength, coordination, balance | Some | Not a priority | Some |
| 3. Action guided by feeling and judgement,i.e. Artistry | All or Most | Some | Some |
| 4. Action competence. Strategic Action | Some | Not a priority | Some |
| **Intrapersonal-Feeling Domain** | | | |
| 1. Meta-affect: Emotional self-awareness. E.g. Taha hinengaro, gratitude | All or Most | Some | All or Most |
| 2. Feeling that leads to action or the moderation of action | All or Most | All or Most | All or Most |
| 3. Feeling that enhances judgement and emotional balance | All or Most | Some | All or Most |

| | Tara | Deb | Daniel |
|---|---|---|---|
| 4. Feeling that leads to conclusions, insights, or inspiration about self | All or Most | Some | All or Most |
| **Intrapersonal-Thinking Domain** | | | |
| 1. Metacognition: self-awareness in thinking | Some | Some | Some |
| 2. Thinking that is persevering, concentrated, and resourceful | All or Most | Some | Some |
| 3. Thinking that is calm, receptive, inspired, and self-confident | All or Most | Some | Some |
| 4. Clear, critical, imaginative, curious and penetrating | All or Most | Some | Some |

The Domains of Ecosphere, Social Justice and Cultural Vision at the Human and Societal system level of the SWM, correspond to and arise in a self-similar way out of the Domains of Action, Feeling, and Thinking. The principle of Sustainable Wellbeing, proposed as signposting a potential attractor configuration—not only for education in New Zealand but for the spirit of all humankind—corresponds to the Total Integrating Self of the individual but should be recognised as possessing a degree of immanence, agency and coherence far below that of the latter at the present stage of our species evolution.

Three of the Delphi round 3 teachers—Tara, Deb, and Daniel—made use of the option provided in the survey to define Sustainable Wellbeing Competencies they would want their students to develop through participating in their SWM Units – 'AGE Adventure', 'Harsh Summer', and 'Urban Farming Outreach' respectively. The Competencies each teacher considered to be "Important for All or Most" students, Important for Some", or "Not a priority" are shown in Table 5-11. Twenty-six of the thirty-four competencies—i.e. 76%—were considered to be "Important for All or Most" students by at least two of the teachers and "Important for Some", by the other. All thirty-four were considered at least "Important for Some" students to develop by at least one of these teachers.

The Interpersonal-Action Domain Competence 2. 'Eco-Trades, resource management and nature conservation skills' was the only Competence to be considered "Not a priority" by two of the teachers, Deb and Daniel. This choice appeared inconsistent to me, given that both these teachers provided SWM Units that are Anchored in the Ecosphere and require students to use practical skills to create material products with a market-oriented awareness. Perhaps the phrase "resource management" appeared inconsistent with "Eco-Trades" and "nature conservation skills". Possibly Deb and Daniel considered their students to be already well advanced in this competence and the meaning I was attempting to convey would have been better expressed as "… for students to develop and or maintain." These findings and the fact that three teachers out of five took the time to select Competencies for their Units in the round 3 survey but only one of them described how they intended to assess student's achievement of these subdomains suggests that more work to develop the Inter and Intra-personal Competency levels of the SWM framework and their assessment criteria is necessary and would also be useful for teachers.

There is also the issue raised by Brent in Section C-3.11 concerning the explicit teaching of what he calls Capabilities, such as collaboration, and his experience that many teachers assume that students learn these crucial skills simply by being expected to use them, for instance by being given small group

activities in the classroom. The range of specific instructional practices and the associated pedagogical expertise implied by the thirty-four SWM competencies is significant and not routinely a part of Secondary School teacher training.

If Competency goals are defined for a teaching Unit then, as Brent observed in the first round of the Delphi Survey, the question of how to assess their achievement by students must also be addressed. He rated the usefulness of the four Domains of the Individual and Interpersonal competencies level of the SWM as "Good" but also noted: "The challenge is how to evaluate [the] development of capabilities". The Delphi round 3 Survey did not ask teachers to specify how they would use NCEA to assess competencies but did ask: "Would you like to describe Assessment Methods Other than existing NCEA standards that you or your teaching team might use to assess and accredit any of the SWM Competency goals you have selected above?" Daniel was the only teacher to respond. He described two methods:

- Self-reported qualitative surveys/observations/ student reflections, and
- Nature connectedness/pro-conservation behaviour assessment

The first method is not dissimilar to the student portfolio self-assessment and advocacy instruments described by both Tara (see Section 5.4.3) and Rebecca (see Section 5.3.10). The present study has only touched the surface of the individual Competencies level of the SWM. This remains an important and challenging direction for future research and the development of the SWM framework.

## 5.4.3 Linking the SWM Framework, with the NZC and NCEA learning areas and levels

### *5.4.3.1 Research Sub-question 2*

Having now examined in detail how the nine SWM Units have been defined by teachers in terms of the SWM framework Sustainable Wellbeing Goals, the NZC Achievement Objectives, and the NCEA Standards, based on this small sample, I reconsider my second research question:

- What links would/could teachers establish between the SWM framework, the New Zealand Curriculum learning areas, and NCEA standards or other appropriate school leaver qualifications?

The phrase 'SWM framework' should be understood as referring to a whole school timetable that includes both CCH and SBS lesson components which are complementary and coherently related to the SWM Domains and Subdomains.

The teachers' judgements about the use of NCEA standards for the assessment of the SWM framework goals whether related to the Subdomains, Place-Based Goals, or the United Nations' SDGs, while largely positive, displayed little consistency. The Sustainable Wellbeing Goals themselves appeared not to be the source of this variability so much as teachers' knowledge about, and experience of the available standards. Also, the needs of their students had to be considered, including whether other teachers were using the same standards with these same students and how readily the assessment of shared standards could be coordinated among teachers. A very similar pattern was apparent for the teachers' judgements about how well the NZC Achievement Objectives they selected for their Units are assessed by NCEA standards.

However, across the six of the nine SWM units outlined for this study that were assigned NZC achievement objectives (see Table C-5, Appendix C-5) and or NCEA standards for assessment (see

Table C-7, Appendix C-6), definite patterns of association between the SWM Human and Societal level subdomains and the Learning areas were apparent. From this point on in the text I refer to them as the 'linked Units'.

At the Individual-Interpersonal level of the framework, the Sustainable Wellbeing Intra and Inter-personal Competencies were not systematically linked to NZC Achievement Objectives or NCEA standards in this study. Three teachers used the SWM framework to define a wide range of Competency Goals at the Inter and Intra personal level for students to develop through their Units but only Daniel took the opportunity to define assessment methods, other than existing NCEA standards, that he used to assess these goals. The pedagogy and assessment of the Competencies remain as challenges for future research.

In light of the government's current Education Reviews, the Curriculum refresh (*Te Mātaiaho*) and of the NCEA Achievement standards (RAS), teachers' views on the likely impact of the RAS on an SWM and the desirability of possible new standards designed for the SWM, were sought and are also reported in this section.

#### *5.4.3.2 SWM Subdomains and the NZC and NCEA Learning Areas and levels*

Among the six linked Units, a strong association was apparent between their anchoring SWM Ecosphere Subdomains and the Learning Areas of Technology, Science, Social Science, and Health and Physical Education. Table 5-12 shows the association between the Anchoring Subdomains and the NZC learning areas in terms of the number of Achievement Objectives selected in each Subdomain-Learning Area combination, for the four Unit outlines that included Achievement Objectives. All four Units are Anchored in the Ecosphere Subdomains and the top five Learning Areas by number of Achievement Objectives are Technology, Science, Mathematics, Social Science, and Health and Physical Education. It should be recalled, however, that only the 'AGE Adventure' Unit selected Achievement Objectives from the Science, Health & Physical Education (see Table C-5).

Table 5-13 shows the corresponding association based on the NCEA standards which were specified for the six linked Units. Table 5-13 includes two Units provided by Anita not included in Table 5-12, one of which is also anchored in an Ecosphere subdomain and the other in a Social Justice subdomain.

When the relative proportions of Achievement Objectives and Standards by learning area in each table are considered, two key findings become clear:

1. The six linked Units are all anchored in either Ecosphere Subdomains or the Social Justice Subdomain; Equity, Rights, and Responsibilities;
2. These Subdomains are predominantly associated with the NZC and NCEA Learning Areas of Technology, Science, Social Science, and Health and Physical Education (which I will refer to as the TSSsH LAs);

*Table 5-12 The association between the SWM Anchoring Subdomains and the NZC Learning Areas (LAs), based on the number of Achievement Objectives chosen per LA for four SWM Units. The LAs are sorted in descending order by Total Achievement Objectives*

| SWM Domain / Anchoring Subdomain / Learning Area | Ecosphere: Maker-Recyclers 1 Unit | Ecosphere: Regenerative-Cultivators 2 Units | Ecosphere: Kaitiaki Guardians 1 Unit | Total Achievement Objectives |
|---|---|---|---|---|
| Technology | 31 | 55 | 9 | 95 |
| Science | | 38 | | 38 |
| Mathematics | | 28 | 6 | 34 |
| Social Science | | 20 | 7 | 27 |
| Health & Physical Ed | | 26 | | 26 |
| English | | 18 | | 18 |
| The Arts | | 11 | | 11 |
| Languages | | 3 | | 3 |
| **Grand Total** | **31** | **199** | **22** | **252** |

*Table 5-13 The association between the SWM Anchoring Subdomains and the NCEA Learning Areas (LA), based on the number of Standards used per LA in six SWM Units. The LAs are sorted in descending order by Total number of NCEA Standards*

| SWM Domain / Anchoring Subdomain / Learning Area | Ecosphere: Maker-Recyclers—EE 1 Unit | Ecosphere: Regenerative-Cultivators—ES 2 Units | Ecosphere: Kaitiaki Guardians—EC 2 Units | Social Justice: Equity, Rights, and Responsib-ilities—SS 1 Unit | Total number of NCEA Standards |
|---|---|---|---|---|---|
| Science | | 11 | 4 | 1 | 16 |
| Social Sciences | | 6 | 6 | 3 | 15 |
| Technology | 2 | 5 | | | 7 |
| Health and Physical Ed | | 5 | | 1 | 6 |
| **Grand Total** | **2** | **27** | **10** | **5** | **44** |

A larger sample of Units representing all nine anchoring Subdomain possibilities would perhaps begin to reveal links between the Cultural Vision and Social Justice Subdomains and the Languages, Arts,

English, and Mathematics Learning Areas that are missing or underrepresented in the nine SWM Units of this study. Some evidence that these are likely links is provided by two of the three SWM Units for which traditional Learning Area Objectives or Standards were not defined. Both Claire's 'Working Title' and Rebecca's 'Te Ara-Year 12' are Anchored in the 'Other Cultures and World Views' subdomain. Claire's Subject specialty is English and Rebecca's are Art and Education for Sustainability. However, the fact that six of the nine SWM Units are anchored in Ecosphere Subdomains in itself suggests that the development of this Domain may be the key priority for progress toward Sustainable Wellbeing - centred secondary school education.

#### *5.4.3.3 New Standards for the SWM subdomains*

Toward the end of the third Delphi Survey, teachers were asked to consider and agree or not with the following statement:

> A new NCEA Achievement standard written specifically to match the Intent of the subdomain in which this project/course is set would be an effective way of accrediting Aotearoa New Zealand students' ability to demonstrate these capabilities for integrated thought, balanced judgement, and agency toward a future of Sustainable Wellbeing for humanity, their community and themselves.

The five, largely positive, responses to this statement are shown in Table 5-14. Tara noted that her school, like Rebecca's, uses student portfolios to record and acknowledge student achievement at this big-picture, pandisciplinary, metacurriculum level as well as directly advocating for individual students with future employers and tertiary institutes. NCEA is not and does not need to be the only way student achievement is recognised, especially in big-picture integration. She wrote:

> Our projects focus not only on the achievement of qualifications but also the development of a portfolio and interaction with other members of the community to develop valuable connections and experiences with people they may work for or with in the future.

While no one disagreed with the statement, Anita was unconvinced. She commented: "There are social studies and health standards which look at these issues already".

According to statistics published by the New Zealand Qualifications Authority (NZQA), there were 169,493 secondary school students assessed for one or more NCEA level 1 to level 3 standards in the 2022 academic year (New Zealand Qualification Authority, 2023a). In Table 5-15 I show ten selected level three NCEA achievement standards arranged in ascending order by the proportion of students assessed for each standard in the 2022 academic year. I have independently characterised each standard as Pandisciplinary, Interdisciplinary, or Disciplinary according to my subjective evaluation of their intended or potential cross-curricular scope. This scope categorisation scheme—with which I hope the reader will concur—coincidentally aligns with increasing student participation reflecting the existing marginalisation of Sustainable Wellbeing and big-picture thinking in general, in the current dominant education paradigm.

Standards 91736 and 90811 are the least and the most popular Environmental Sustainability standards respectively. None of the Sustainability standards attracted more than 1% of the students. The two favoured by Daniel and Tara for their SWM units both attracted only 0.7% participation and these were the only two standards approved for University Entrance (UE) among the forty identified for the six SWM Units with NCEA standards assigned.

The Statistics, English, and Physical Education standards in Table 5-15 were ranked first, second and tenth respectively by student participation among all level three standards assessed in 2022. 91501 was the only standard in the top ten not from either the English or mathematics learning areas. That 14% of the students participated in Biology standard 91602 might indicate that it could serve as a 'bridging' standard for CCH Units in any school wanting to introduce an SWM stream or academy option to their programme.

*Table 5-14 Teachers' responses to the idea of new NCEA standards designed specifically for the SWM subdomains*

| | SWM Anchoring Subdomain | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|
| Anita | Equity, Rights and Responsibilities | | | |
| Daniel | Regenerative-Cultivators | | | |
| Deb | Maker-Recyclers | | | |
| Mathew | Kaitiaki Guardians | | | |
| Tara | Regenerative-Cultivators | | | |

### *5.4.3.4 The Review of Achievement Standards (RAS)*

In February 2020, the New Zealand government confirmed a package of seven changes to strengthen the NCEA qualification as part of its NCEA Review of Achievement Standards (RAS) process. These changes are:

1. Make NCEA more accessible
2. Mana ōrite mō te mātauranga Māori (equal status for mātauranga Māori in NCEA)
3. Strengthen literacy and numeracy standards and assessments
4. Fewer, larger standards—new achievement standards and resources will be developed to replace existing standards and ensure the qualification achieved credentials the most significant learning in a learning area or subject.
5. Simplify NCEA's structure.
6. Clearer pathways to further education or work– develop a Vocational Entrance Award to clearly signal when a student is ready to transition into higher-level vocational education and strengthen vocational pathways through NCEA.
7. Keep NCEA Level 1 optional. (NZ Ministry of Education, 2023b)

*Table 5-15 Ten NCEA Level 3 standards showing the proportion of Level 1 to 3 Students Assessed for each in the 2022 academic year (NB. The proportions of Level 3 students alone would be considerably higher)*

| Scope | Std | Domain | Title | % of Students |
|---|---|---|---|---|
| **Pandisciplinary** | | | | |
| | 91736 | Environmental Sustainability | Analyse how different worldviews, and the values and practices associated with them, impact on sustainability | 0.2% |
| | 91735 | Environmental Sustainability | Evaluate measures that may be taken to sustain and/or improve a biophysical environment | 0.7% |
| | 90828 | Environmental Sustainability | Evaluate a personal action that contributes towards a sustainable future | 0.7% |
| | 90811 | Environmental Sustainability | Explain how human activity in a biophysical environment has consequences for a sustainable future | 1.0% |
| **Interdisciplinary** | | | | |
| | 91527 | Physics | Use physics knowledge to develop an informed response to a socio-scientific issue | 2.0% |
| | 91411 | Earth and Space Science | Investigate a socio-scientific issue in an Earth and Space Science context | 4.0% |
| | 91602 | Biology | Integrate biological knowledge to develop an informed response to a socio-scientific issue | 14.1% |
| **Disciplinary** | | | | |
| | 91501 | Physical Education | Demonstrate quality performance of a physical activity in an applied setting | 17.5% |
| | 91473 | English Oral Language | Respond critically to specified aspect(s) of studied visual or oral text(s), supported by evidence | 22.6% |
| | 91581 | Statistics | Investigate bivariate measurement data | 24.5% |

The changes planned for level 1 were to be fully implemented in 2024 with levels 2 and 3 to follow in 2026 and 2027 respectively (NZ Ministry of Education, 2023a). Items 2, 4 and 6 are of particular relevance to the SWM. Item 4 has implications for the ease with which standards can be recombined to support cross-curricular courses. The Core group teachers had a range of views on how these changes might affect their practice. All the views reported here were expressed in the period between April 2021 and April 2022.

When the RAS consultations were first announced, Brent said he had felt positive about the opportunities they might offer to advance his school's Innovation Stream programme. However, when the new standards came out, he and his colleagues realised "This is gonna be a lot harder than we thought." I asked him if he thought the fewer, larger aggregated standards were going to be helpful. "They're a step backwards" was the reply;

> … because [there's] more credits [per standard] it's higher stakes on one standard. So it's actually harder. We're trying quite hard with our heads of learning areas to come up with some cross-curricular links between the new standards. .... But …, because they're bigger, and they're worth more. It's in some ways a bit harder.

Tara "Somewhat disagreed" with the statement "that the new NCEA RAS standards will improve teachers' ability to assess and accredit student achievement for this Sustainable Wellbeing Unit". She commented:

> There seems to be more prescription within the RAS and less [opportunity] to apply the NZC to a local curriculum, especially with externally assessed standards. This does not lend itself to student-led learning design.

Anita, Deb and Daniel "Neither Agreed nor Disagreed" with the statement. I asked Anita, if that was because it was just too early to tell. She replied:

> I like the look of some of the standards, ... Some of the science ones would fit really well with sustainability, I thought and geography …. they're quite flexible …, where you could pick your own project ... So I think I'm probably going to be okay. That's why I neither agreed nor disagreed. I was worried about the lack of choice. But I do think most of the ones that I already teach are still in there.

Nicola's extensive background in Education for Sustainability has given her a strong position from which to comment on how well the subject is served by the existing NCEA qualifications system and how it might be affected by the significant system changes currently underway. From the point of view of enabling the transition of New Zealand secondary schools toward a Metacurriculum where Sustainable Wellbeing is central and recognised as a discipline in its own right, her observations are not particularly encouraging. She expressed some frustration at how Sustainability as a subject is not well signposted for teachers in official documentation and that this situation seems to be getting worse through the government's current curriculum refresh and Review of Achievement Standards (RAS) initiatives. In commenting on how Sustainability credentials and expertise are increasingly a central concern for many businesses and organisations Nicola remarked:

> It struck me as very, very odd that the review of achievement standards has removed sustainability completely and replaced it with something else. … in a lot of schools, they seem to have two teachers, students go between one from science and one from social science, but the actual name of it has now gone from education for sustainability, which was always a problem because it starts with E for education, so when people look up sustainability on the UE list [University Entrance approved subjects list] they think it's not there because they look under S. But they've now …, got rid of that word sustainability altogether. And it's going to be called environment, … community and environment, I think something like that...

As of June 2023, the provisional name for the subject formerly known as 'Education for Sustainability', is 'Environment and Societies' and it remains located within the Social Sciences Learning Area of the New Zealand Curriculum. Adding to the obfuscation—whether inadvertent or deliberate—as shown in Table C-7, the Education for Sustainability NCEA Standards are placed by the NZQA under the Social Sciences Domain of "Environmental Sustainability". Nicola was appointed as a 'critical friend' to the social studies Subject Expert Group at one stage. She recalls observing resistance amongst the

members of this Group to include more Education for Sustainability (EfS) principles within the scope of the Social Studies subject standards.

> … the changes that were proposed for Level Two ... Social [Studies], when it came for approval at that meeting, there was a lot of resistance to the changes. And …, a lot of the changes did, in fact, incorporate the EfS principles. And that was, …a 'people holding on tightly to what they know', ... situation.

Rather than perceiving the concept of Sustainable Wellbeing as an emerging speciality subject, let-alone a pandisciplinary complementary knowledge system, from Nicola's perspective it seems the official process is preferring, with a traditional knowledge silos mindset, to disintegrate the concept as an organic totality and distribute its organs to the established learning areas for subordination to their disciplinary perspectives.

In contrast to Brent, Nicola thought the Ministry of Education's intention to aggregate the existing NCEA standards into fewer, larger standards could potentially be a good thing for the curriculum. She explained:

> When you've got four credit standards, there is so much variability between how much work you have to do in one subject compared to another to get four credits. I mean, it is a massive difference. And so I think some of that has been addressed by having … more standardized numbers of credits for every subject and doing four topics rather than, however many different topics you did before.

I asked if she thought teachers would be able to split the requirements for students to meet the standards across Units in ways that would support cross-curricular Units. "Yeah, I would say so" was the reply. Exactly how that splitting might be achieved in practice was a conversation we did not have time to pursue.

### 5.4.4 Section Summary

Based on the limited number of Sustainable Wellbeing Metacurriculum Units that were linked to NZC Achievement Objectives and/or NCEA assessment standards in this study, I can only offer an indicative partial answer to my second research question. Multiple links can be established between the meta-concept of 'Sustainable Wellbeing', through the SWM framework Domains, Subdomains, and Goal to the New Zealand Curriculum learning areas, and NCEA standards. These links suggest broad patterns of associations between groups of the SWM Subdomains and Groups of Subjects in the established Learning Areas but the bias in this Study toward Units anchored in the Ecosphere Subdomains limits the scope of inferences about these patterns. The following points are based on the Core Participant teachers' contributions, particularly the six Units explicitly linking Anchoring Subdomains to Learning Areas by selecting NZC Achievement Objectives and/or NCEA assessment standards.

- The six Linked Units are anchored in the three Ecosphere Subdomains and the Social Justice–Equity, Rights, and Responsibilities Subdomain, are most strongly linked to the Technology, Science, Social Science, and Health and Physical Education Learning Areas.
- Despite the bias of the Anchoring Subdomains toward the Ecosphere, the six Linked Units collectively have Connecting Subdomains in all nine subdomains of the framework.
- The six Linked Units are all designed for year 11 to 13 students but identify NZC Achievement Objectives mainly from levels 5 and 6 of the NZC and level 1 of the NCEA qualification.

- Two teachers referred to the use of student portfolios for advocacy and recognising student achievement including competency self-assessment. Individual Competency theorisation and assessment remain an important aspect of the SWM framework for future research and development.
- The current marginalisation of education for Sustainability and Wellbeing it seems is not due simply to a lack of available assessment instruments.
- There was no consensus around the implications of the current government Review of NCEA Achievement Standards (RAS) for Cross-Curricular course designs such as the SWM proposes.

## 5.5 SWM Use and Usefulness

### 5.5.1 Section Overview

This Chapter has focused on the use and further development of the co-constructed framework for a Sustainable Wellbeing Metacurriculum. In this summary, I return to the two goals of phase three of the study mentioned in the chapter overview. First, how well did the SWM Domains and Subdomains characterise and differentiate the whole diverse range of Sustainability and Wellbeing-oriented courses and projects my participants were teaching? Second, to what extent could the ideal of a whole school approach to Sustainable Wellbeing involving all learning areas be realised in their schools—through a combination of cross-curricular holistic and subject-based specialist pedagogies—specifically through links between the framework Subdomains, the NZC and NCEA? I also take stock of progress at this point in my thesis, toward describing the education attractor SWM configuration by asking; What aspects of schools as complex adaptive systems appear to be most associated with enabling and centring Sustainable Wellbeing in the life of the school and its curriculum?

### 5.5.2 Evaluating the Framework and Co-construction Process

At each phase of this study, I asked the participants for feedback on the usefulness of the emerging Sustainable Wellbeing Metacurriculum framework for thinking about Sustainable Wellbeing Education and on the co-construction process itself. The aggregated evaluations of all teachers involved in the first two phases were presented in Sections 4.5.3 and 4.5.4. As stated in the overview of this chapter, the 'SWM Attractor' analogy requires a radically inclusive view of educators' diverse professional perspectives. Understanding the Non-Core participants' perspectives and their likely reasons for not proceeding to Phase 3 of the study is thus as important as learning from their more engaged Core Participant colleagues. The contrast between these groups is a major theme of Chapter 6. I begin therefore with a review of the fourteen Non-Core participants' evaluations of the framework, before considering the Core Participants' feedback. Table 5-16 shows how the Non-Core Participants' evaluations of the framework moved between the first two phases of the study. The original multi-choice scale for responding to these questions had just five steps. The "Good/ Very Good" step which has no participant names in this table, was introduced to accommodate Brent's response to the question during his interview—"between 3 and 4"—as shown in Table 5-17.

Three participant subgroups can be identified in Table 5-16. The consistently 'Fair to Good' subgroup includes Simon, Gemma, Holly, and Tracey. The consistently 'Very Good to Excellent' enthusiastic subgroup includes Amber, Anthony, Belinda, Bridget, Brittany, Lucy, and Megan, albeit Belinda only joined the study for Phase 2. The 'Mixed feelings' subgroup, Bronwyn and Stephanie, were both indifferent about the Human-Societal level but enthusiastic about the Individual-Interpersonal level of the framework in the first Delphi survey. Bronwyn transitioned to feeling positive about the

augmented Human-Societal level framework in the second Delphi round while Stephanie maintained her merely 'Fair' evaluation of this level. One teacher, Philippa, got no further than the third section of the ten in the first Delphi Survey so does not appear in this table.

There may have been a variety of reasons why these thirteen teachers did not continue through to Phase 2 of the study. In Section 4.5.4.1 the possibility that the improved teacher evaluations of the framework of Phase 2 were due to an attrition effect of having lost the more critical participants between Phase 1 and Phase 2 was tested and rejected. Table 5-16 confirms this finding. Three teachers from the 'Fair to Good' subgroup did not proceed to Phase 2 but neither did four from the 'Very Good to Excellent' subgroup. Furthermore, Bronwyn, who participated in both phases increased her rating from 'Good' to 'Very Good' in phase 2.

*Table 5-16 The thirteen Non-Core Participant teachers' ratings of the overall usefulness of the SWM framework for thinking about Sustainable Wellbeing Education, over the first two study phases they participated in*

| Mean Rating | Standard Deviation of Mean Rating and number of teachers | Poor (1) | Fair (2) | Good (3) | Good/ Very Good (3.5) | Very Good (4) | Excellent (5) |
|---|---|---|---|---|---|---|---|
| **Phase 1: Delphi Survey, round 1** | | | | | | | |
| | **Rate the usefulness of the three Domains at the *Human and Societal level* for thinking about Sustainable Wellbeing Education.** | | | | | | |
| **3.5** | 0.80<br>n=12 | | Simon | Bronwyn<br>Gemma<br>Holly<br>Stephanie<br>Tracey | | Amber<br>Anthony<br>Bridget<br>Lucy<br>Megan | Brittany |
| | **Rate the usefulness of the four Domains at the *Individual and Interpersonal levels* for thinking about Sustainable Wellbeing Education.** | | | | | | |
| **3.9** | 0.93<br>n=9 | | Holly | Gemma | | Amber<br>Bridget<br>Bronwyn<br>Megan<br>Stephanie | Brittany<br>Lucy |
| **Phase 2: Delphi Survey, round 2** | | | | | | | |
| | **Rate the overall usefulness of the nine subdomains at the *Human and Societal level* for thinking about Unit design for Sustainable Wellbeing Education.** | | | | | | |
| **3.6** | 1.14<br>n=5 | | Stephanie | Holly | | Belinda<br>Bronwyn | Lucy |

Nevertheless, two issues of particular concern for the 'Fair to Good' subgroup are worth examining. Simon felt that the SWM could devalue substantive subject-based knowledge in favour of "constructivist logic". He wrote:

> The problem I have is that this is dominated by constructivist logic that does not encourage the acquisition of testable knowledge and [does not] encourage students to develop highly specialized skills that will raise the ability of mankind [sic] to address its future problems in a real rather than a philosophical manner.

Other teachers expressed concern over the perceived excessive demands the SWM would make on individual teachers' disciplinary breadth, level of knowledge and pedagogical skills. They appeared not to be thinking in terms of the possibility of cross-curricular teaching teams. Holly wrote:

> Whilst this would be an interesting course and would cover a huge range of ideas, it would potentially be difficult to have one teacher at a high school level teach all three disciplines successfully, given that most high school teachers are subject specialists. So, it would depend on how this was delivered.

And Stephanie wrote:

> The whole language of this project needs addressing- the words need to be simplified as much as possible and the outcomes need to be very clear and precise for this curriculum to be of use. It is too 'high level' at the moment- it refers to many themes, contexts and concepts [that] are too challenging for the Year 11 to 13 age group and are also outside the understanding of most teachers.

Bronwyn also mentioned some language choices in the framework as being problematic and, "Also, these [Subdomain] descriptors would need to be supported with examples of programmes to help unpack the concept for educators". Gemma was also feeling the weight of expectations outside of her professional training when she wrote of her need for:

> Some pre-reading on the aspects discussed. I am in a Science field - and less experienced in the others. Hence my responses to many questions come from my personal life - not my experience in a classroom setting.

A third difficulty mentioned by teachers in both subgroups related to concerns about specific subjects that they could not see connected to the SWM subdomains and Subdomain Goals in any obvious way. Gemma again asked, "Where would technological aspects fit within this - this is a large and growing area of significance?" which was echoed by Lucy, one of the two teachers to give the SWM framework an 'Excellent' rating. She wrote:

> I like it because it covers everything. … I do wonder about acknowledging the impact of technology on our world today. It has an incredible influence on all of the above, for better and for worse. The movie 'The Social Dilemma' brings up some really good points. I feel that our students are suffering in many different ways, due to technology. I feel we need to make this influence more explicit.

Finally, just the burden of a full-time teacher workload also influenced participants' capacity to persevere into Phase 3 of the study. Lucy, again, at the end of the first Delphi survey wrote:

> I spent too much time, in the beginning, filling this out, then realised how much was required and I am time deficient, so I started making briefer answers. I have so much more to say on everything in your survey. I love your ideas. Thank you for putting them out there.

In response to the same invitation for general comments, Megan responded, "I am running out of time, sorry! …. I am happy to talk to you in more depth if you want."

Turning now to the nine Core Participants, Table 5-17 below shows how their evaluations of the framework moved across all three phases of the study. The overall pattern, of the Core Participants' responses for the first two phases, is similar to the Non-Core participants over the first two Delphi rounds. The mean rating for the Human-Societal (H-S) level improved from 3.1 to 3.8, and the consensus also improved as the standard deviation of responses fell from 0.74 to 0.63. The four Domains at the Individual and Interpersonal levels are slightly better supported than the three Domains at the Human and Societal level of the framework but the consensus is a little weaker. There are however also notable differences between the two groups consistent with those as already observed in Section 4.5.4.1, between the teachers who only participated in round 1 and those who continued to round 2. The Core group was less enthusiastic about both levels of the framework initially but more positive about the H-S level in round 2.

From the improvement in rating, we could infer that the teachers felt their feedback and suggestions for improving the framework had largely been well incorporated following the round 1 survey. The experience of completing the surveys may also have influenced ratings. While in both rounds most of the teachers felt the time they spent completing this survey was "about what I expected", in round 1 eight said that it took "more than I expected" and one, Lucy, said "much more than I expected". However, all but one of these teachers returned for round 2, including Lucy. In round 2, 11 teachers answered this question with "about what I expected", and two said "less than I expected".

The ratings trend was reversed for the last two stages of the study to end more or less where they started with a mean of 3.2 and a standard deviation of 0.75. It should be noted though that only five teachers completed round 3 of the Delphi Survey, and I did not put the evaluation question directly to either Anita or Nicola during their interviews. Anita's concerns–as we'll see–were more about the survey co-construction process and without her "Fair" rating the final average would have been "Very Good". Although still in the "Good" to "Very-Good" zone, the Phase 3.2 ratings decrease was accompanied by some very helpful suggestions. There were important lessons here for me as the researcher about both the SWM framework design and the metacurriculum co-construction process.

The degree of consensus shown by the ratings standard deviations in Table 5-17 is good by comparison with what has been deemed acceptable in previous Delphi studies. Interpreting the nature of the apparent consensus Is not so straightforward, however. Apart from the intrinsic variability in teachers', educational philosophy, and professional knowledge outside their subject areas, already noted in Section 5.4.3 concerning NCEA standards, it's clear in Table 5-17 that the process of successive evaluations was more variable for some teachers than others. Anita for instance went from "Fair " in round 1 up to "Very Good" in round 2 and back to "Fair in round 3" while Mathew and Daniel remained at "Very Good" throughout all stages apart from Daniel dropping to "Good" in round 3 of the Delphi Survey. More importantly for the researcher, there is the challenge of getting all participants on the same page regarding the details and intent of something as far-reaching and novel as a co-constructed metacurriculum, before asking for evaluations, that is, the evaluations are not just

of the framework but also reflect how individual teachers engaged with the co-construction process itself.

*Table 5-17 The nine Core Participant teachers' ratings of the overall usefulness of the SWM framework for thinking about Sustainable Wellbeing Education over the three study phases.*

| Mean Rating | Standard Deviation of Mean Rating and number of teachers | Poor (1) | Fair (2) | Good (3) | Good/ Very Good (3.5) | Very Good (4) | Excellent (5) |
|---|---|---|---|---|---|---|---|
| **Phase 1: Delphi Survey, round 1** | | | | | | | |
| | **Rate the usefulness of the three Domains at the *Human and Societal level* for thinking about Sustainable Wellbeing Education.** | | | | | | |
| 3.1 | 0.74<br>n=9 | | Anita<br>Brent | Claire<br>Nicola<br>Rebecca<br>Tara | | Daniel<br>Deb<br>Mathew | |
| | **Rate the usefulness of the four Domains at the *Individual and Interpersonal levels* for thinking about Sustainable Wellbeing Education.** | | | | | | |
| 3.2 | 0.79<br>n=9 | | Anita<br>Deb | Brent<br>Claire<br>Rebecca | | Daniel<br>Mathew<br>Nicola<br>Tara | |
| **Phase 2: Delphi Survey, round 2** | | | | | | | |
| | **Rate the overall usefulness of the nine subdomains at the *Human and Societal level* for thinking about Unit design for Sustainable Wellbeing Education.** | | | | | | |
| 3.8 | 0.63<br>n=9 | | | Brent<br>Claire<br>Deb | | Anita<br>Daniel<br>Mathew<br>Nicola<br>Tara | Rebecca |
| **Phase 3.1: Interviews between Delphi rounds 2 and 3** | | | | | | | |
| | **If you gave the framework an overall valuation again, at this point? Where would you put it on that scale?** | | | | | | |
| 3.6 | 0.41<br>n=4 | | | Deb | Brent | Daniel<br>Mathew | |
| **Phase 3.2: Delphi Survey, round 3** | | | | | | | |
| | **Rate the overall usefulness of the Sustainable Wellbeing Metacurriculum framework for Unit planning based on your experience with this SWM Delphi round 3 questionnaire.** | | | | | | |
| 3.2 | 0.75<br>n=5 | | Anita | Daniel<br>Deb | | Mathew<br>Tara | |

Before the first Delphi Survey round and after each successive round I circulated readings to the participants summarising the main findings of the previous round and introducing the aims of the following round. Teachers have varying levels of priority and available time that they are willing to give to participate in research studies. In round 2 Rebecca gave the SWM framework its only "Excellent" rating and wrote, "Great work! Very clear. Ngā mihi. … [It] Was great to read the findings of the first survey. Thanks for sharing." By contrast, during his interview which followed after the report of the second Delphi round had been circulated, Brent appeared not to have read any of that feedback. He explained the "Good/ Very Good" rating he gave as follows:

> My only concern is where it would fit. Do you perceive this as a whole curriculum? Or is this a particular percentage of [the timetable?] My rating there is around just thinking, [if] …, We have five subject lines. If this was two lines, it would probably make sense and I'd probably give it a higher rating. If it was covering the whole curriculum as … core subjects, for example, it still seems quite narrow.

That he had come to this conclusion was a strong affirmation of the 40:60, CCH:SBS timetable split that had emerged from the first Delphi round and had been built into the SWM framework from round 2 onwards. What was it about the way I had attempted to communicate this concept and his interpretation of it, that led to Brent not making this connection earlier between the CCH:SBS timetable split and the ratio of two to three subject lines?

Daniel dropped his overall rating of the SWM framework from "Very Good" to "Good" in the final round of the Delphi but did not make clear exactly why. Some of his earlier comments around the accessibility of the terminology and language being used for both students and teachers reinforce doubts raised about the wording of the Sustainable Wellbeing Goals introduced in round 3 as perhaps too broad and multi-faceted. During his interview, he qualified the "Very Good" rating he gave by adding:

> It sounds great in theory, but, you've just got to see it, in practice and get the feedback because like,... I get it, you know, I've been in this world for years now, and I get the terminology and I get the connections pretty well, but it's the average teacher. And their interpretation of it,...I don't know. ... I think you have avoided a lot of the issues ..., around inaccessible or, hard-to-use terminology. … So for a teacher, I think you're pretty close. But you'd have to talk to the average Joe teacher as well. ...

Deb's ratings were consistently "Good" after round 1. Her reservations about a possible over-emphasis on cross-curricular lessons as opposed to time for subject-based specialisation in the timetable were covered already in Section C-3.6. Tara though had no such concerns, rating the usefulness of the framework consistently as "Very Good". In the second Delphi round she commented "This is a wonderful project which embraces our school philosophies and values." And in the third round; "Really enjoying the alignment with our philosophy and experiencing the explicit details linked to the NZC of what we are already doing."

The importance of the co-construction process to the evaluation of the goal is best demonstrated by Anita's final comment in the third Delphi round. Anita was arguably the most engaged of all the study participants by being involved in all three Delphi rounds, providing two SWM Units, an interview as well as school documentation and a webinar about her team-taught Āhuarangi-Climate course. Four of the five teachers who completed the third round of the Delphi survey said that the time they spent

on it was “more than I expected”. Anita described the time spent as “about what I expected”, but she also wrote:

> This was a difficult round for me … I had trouble remembering what was in all the domains and what the aim of each was. Therefore planning a course addressing these domains felt like a lot of work which is why I gave up. I could [imagine] something like this working better in a day workshop where everyone goes through the curriculum purpose and possibilities in the morning and then teachers build a course together in the afternoon while the ideas are still fresh in their minds. I found it hard to come back to this after several months and remember what it was all about.

Attempting total curriculum redesign through a survey and interview process with a diverse range of colleagues is ambitious, even when those colleagues are already convinced of the importance of education for sustainability and wellbeing.

From these findings, I conclude that the SWM framework that emerged from the first two Delphi rounds is useful and enabling for thinking about Sustainable Wellbeing Education. The SWM Domains and Subdomains, at the Human-Societal level, could readily be used to characterise and differentiate the diverse range of Sustainability and Wellbeing-oriented Units my participants were teaching. However, concerns about the nature, intent, and workload implications for teachers were raised particularly by the Non-Core study participants which may reflect inadequate communication on my part of these aspects of the framework. Specifically, these concerns were:

- The potential for substantive knowledge-based curriculum to be undermined by ‘constructivist’ pedagogy
- Excessive demand on individual teachers’ level and breadth of knowledge.
- Not realising the significance of the team-teaching element of the SWM
- Not realising that making specific connections between the framework Subdomains and traditional subject areas was to be the work of Phase Three of the study.

The process of using the framework for more detailed Unit planning, as attempted in the third Delphi Survey round, was fruitful in the context of this research project but improvements to the research design and next steps toward the research objectives also became apparent, specifically:

- The wording and purpose of the Sustainable Wellbeing Goals attached to the nine SWM Subdomains need further clarification, refinement and ongoing consideration.
- The wording of the Sustainable Wellbeing Competencies at the inter and intra-personal orientations of the individual level needs further refinement, and more consideration could usefully be given to their explicit pedagogy and assessment.
- An online survey is not the ideal platform for curriculum work at a high level of planning detail and could be more appropriately undertaken within, for instance, the context of a whole school, teachers-only day workshop.

### 5.5.3 The Sustainable Wellbeing Metacurriculum as a complex system attractor

In the overview of this Chapter, I argued that the co-construction of the Sustainable Wellbeing Metacurriculum framework could facilitate the emergence of an education attractor SWM configuration theoretically and imaginatively from within, and the Core Participant case studies could serve to characterise the Attractor and paths toward it empirically, at the whole school level, and thus describe its emergence from without. In Section 5.3.12 I listed factors arising from the Core Participant perspective case studies that appear most relevant to the 'SWM Attractor' analogy. This list was eventually extended to a total of nineteen. In Sections 6.4 and 6.5 of the following Chapter, I assess the relative importance of these factors and analyse in more detail what the core participant schools can tell us about the form of a possible education system attractor configuration for Sustainable Wellbeing-centred education.

Before presenting that analysis, however, I step back to consider the phrase 'all secondary schools in Aotearoa New Zealand' in my main research question. Chapter 6 examines first how the core participant schools and the Study schools as a whole, fit demographically within the broad educational space of New Zealand secondary schools. It then compares the suggestions of all twenty-two participants—from phase one of the study—about the factors that most enable or constrain the potential implementation of an SWM in this country, and what needs to change at the individual school, local community, and Nation-Societal levels to progress such a transformation. Throughout the Chapter, the Core Participants and their schools are compared and contrasted with Non-Core Participants and their schools, to form as complete as possible a picture of the diversity of trajectories schools might follow in the attractor-space of educational possibilities to enable a system-wide transition from the current dysfunctional Business as Unsustainable configuration toward a new Sustainable Wellbeing Metacurriculum configuration.

# Chapter 6 A Sustainable Wellbeing Metacurriculum for Aotearoa New Zealand Secondary Schools

## 6.1 Overview

The main research question motivating this study asks, what would enable all secondary schools in Aotearoa New Zealand to establish a Sustainable Wellbeing centred Metacurriculum (SWM) for their years 11 to 13 students? Having recounted how an SWM framework was constructed in Chapter 4 and used to define existing and potential SWM Units of teaching and learning in Chapter 5, this chapter steps back to consider the comprehensive 'all' in this question.

Throughout this thesis, I have used the analogy from Complex Systems thinking of seeing New Zealand secondary schools as moving within a space of educational possibilities relative to two alternative system attractor configurations. I have characterised the Business as Unsustainable (BaU) attractor as the current unsustainable configuration of the attractor dominated by traditional strongly classified subject-based education with a few marginalised examples of cross-curricular holistic teaching, and the SWM as a label for the, as yet minority, but emerging pandisciplinary and ultimately more resilient, paradigm for schooling, which combines Cross-Curricular Holistic (CCH) and Subject-Based Specialist (SBS) approaches in a complementary way to focus learning on confronting our collective Sustainable Wellbeing crisis. In this chapter, I combine what can be learned from publicly available databases about the demographic attributes of the schools represented in this study with what can be learned from the participants about their schools. These two perspectives reveal four typical trajectories New Zealand schools follow in relation to the SWM Attractor state and illuminate possible paths of transition schools wanting to implement a Sustainable Wellbeing Metacurriculum might follow.

Section 6.2 compares the twenty-two Study schools with the 505 other New Zealand senior secondary student-inclusive schools based on eight key demographic variables to examine how representative the Study schools are of the latter. Section 6.3 presents the views of all participants on what factors at the School, local Community and National-Societal levels appear to most enable or constrain progressive change toward an SWM implementation. In Section 6.4, I focus on the nine Core Participant schools and use my subjective evaluation of their progress toward Sustainable Wellbeing education—based on the case studies of Section 5.3 and principal component analysis—to identify the educational factors that seem most strongly associated with their progress toward an SWM.

Section 6.5 concludes the chapter by assembling the key findings of the three previous sections to characterise four typical trajectories within the current BaU configuration of the secondary schooling attractor possibilities and the nature of possible paths of transition between these trajectories and toward the sustainable SWM state ideal for the system as a whole.

## 6.2 Demographic Characteristics of Study Schools

### 6.2.1 Section Overview

In this section, I first compare the demographic characteristics of the twenty-two 'Study' schools with the 505 other New Zealand senior secondary student-inclusive schools which I refer to as the 'All-Other' schools. Second, I compare the seven Study schools whose teachers provided an SWM Unit outline with those that did not. Senior secondary student-inclusive schools have enrolled students in their final three years 11 to 13 of high school (mainly 16 to 18-year-olds), but most also enrol younger

students. The analysis identifies some significant demographic differences among these groups of schools related to their teachers' initial interest in a study about a Sustainable Wellbeing Metacurriculm and the variability of the teachers' perseverance through the study's three phases.

The data for this analysis were downloaded from the New Zealand Ministry of Education's (MoE) website[10] and were current as of 1 July 2022. The total roll of the 527 schools (22 Study and 505 All-Other) was 327,642 and includes the majority of the 146,847 students enrolled in years 11 to 13 at that date, excluding the 13,178 enrolled at Te Aho o Te Kura Pounamu (The Correspondence school).

The analysis includes a subdivision of the twenty-two Study schools into seven 'Unit' and fifteen 'No-Unit' schools. One of the twenty-three teacher participants who completed phases 1 and 2, Amber, was relief teaching in different schools and did not name a particular school as her employer. The Unit schools are a subset of the Core Participant teachers' schools that were the focus of Chapter 5, as shown in Table 6-1. Claire and Brent's schools are included in the No-Unit group since they did not provide complete Outlines for recent, existing or planned years 11 to 13 SWM Units.

The following demographic analysis has two objectives The first is to understand in what ways the twenty-two Study schools are representative or not of New Zealand secondary schools in general. The second is to investigate how the Unit group differs or not from the No-Unit group. The statistical methods used were detailed in Section 3.6.4.3

In Section 6.2.2 I present the key demographic characteristics of the nine Core Participants' schools which includes the subset of seven Unit schools. Section 6.2.3 compares the twenty-two Study schools with the 505 All-Other schools and Section 6.2.4 extends the analysis by focusing on the differences and similarities between the Unit and No-Unit schools. The comparative analysis of the Unit, No-Unit, and All-Other schools is based on eight variables. Six demographic variables were available from the MoE's directory of schools: Total school roll, Gender of the Students, Student Ethnic proportions, School decile (a socioeconomic metric), School character (a composite variable based on three separate fields of administrative categories), and Urban-Rural location. The seventh and eighth variables—Attainment Rates for University Entrance and the National Certificate of Educational Achievement (NCEA) level 2—were obtained from the New Zealand Qualifications Authority (2023a).

Since school rolls vary widely, each comparison has been made at both the level of whole schools and of the individual student. Statistics at the latter level are calculated as the whole-school statistic weighted by the school's total roll. This provides a measure of the typical student experience of these demographic variables (which serves also as a proxy for teachers' experience within the limits of student-teacher ratio consistency). Analysis at the whole school scale is important because the SWM is a whole school, whole curriculum concept that requires evidence of success at the whole school level. Senior Leadership Teams (SLTs) must be convinced of its value and there is just one SLT per school. Analysis at the level of individual students is also crucial since in a healthy democracy, students, teachers, and parents are ultimately the basis for social and political transformation. In the commentaries that follow I have used the word 'substantially' to describe differences that are both materially important and statistically significant (at the level of confidence stated). The findings presented in this Chapter are a digest of the complete analysis, the details of which appear in Appendix D-1.

[10] https://www.educationcounts.govt.nz/directories/list-of-nz-schools

### 6.2.2 The Core Participants' Schools

Table 6-1 compares demographic data for the nine Core Participant schools. The seven Unit schools are listed above with Brent and Claire's No-Unit Schools below. While Brent and Claire belong to the Core Participant group through perseverance to Phase 3 of the study, they did not provide complete Unit outlines and it is clear from this table that their schools have total rolls twice as big as Nicola's, the largest of the Unit schools. Like Nicola's school, they are also Co-Ed, State Secondary Schools for years 9 to 15 students. Claire did not volunteer to be interviewed so I know very little about her school from her perspective. Brent's views on why the SWM would be difficult to implement in his school are presented in Section 5.3.11. Many of the constraints he identifies may also apply in Claire's school.

The Core Participant schools are diverse in terms of their student ethnic proportions, school character, and socioeconomic deciles. They are all Urban rather than Rurally-located schools. In Section 6.2.3 I define school character more precisely as a combination of the fields: School Authority, School Type, and School Definition as shown in Table 6-1. School decile was a metric used by the New Zealand government for 30 years up to the end of 2022 to allocate funding to state and state-integrated schools. The decile steps ranged from 1 for schools serving the lowest socio-economic communities to 10 at the highest point of the scale. In January 2023 the Ministry of Education replaced decile ratings with an 'Equity Index' based on "access to improved data and a better understanding of the socio-economic factors that have the most impact on student achievement" (NZ Ministry of Education, 2022a).

*Table 6-1 Demographic data for the Nine Core Participant's Schools with the Seven Unit schools above and Brent and Claire's No-Unit Schools below*

| Unit Grou | Teacher | SWM Unit titles | School Authority | School Type | School Definition | Decile | Urban Area | Total Rol | Maori % | European % | Pacifika % | Asian % | MELAA% | Other Ethnicities | Inter-nationa |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit | Anita | • **Education for Sustainability**<br>• **Āhuarangi Climate** | State | Composite | Designated Character School | 7 | Main Urban Area | 641 | 15% | 74% | 1% | 7% | 2% | 1% | 0% |
| Unit | Daniel | • **Urban farming outreach** | NA | Trades Academy (16 to 18 yo) | | | Main Urban Area | 162 | 75% | 25% | 0% | 0% | 0% | 0% | 0% |
| Unit | Deb | • **Harsh Summer** | State | Secondary (Year 7-15) | | 4 | Secondary Urban Area | 771 | 39% | 39% | 9% | 8% | 4% | 1% | 0% |
| Unit | Mathew | • **Business Studies Level 2** | State : Integrated | Secondary (Year 7-15) | | 6 | Main Urban Area | 442 | 31% | 53% | 4% | 9% | 2% | 1% | 0% |
| Unit | Nicola | • **Self-watering planter boxes** | State | Secondary (Year 9-15) | | 3 | Main Urban Area | 1027 | 21% | 3% | 60% | 13% | 3% | 0% | 0% |
| Unit | Rebecca | • **Te Ara year 12** | Private : Fully Registered | Secondary (Year 7-15) | School with Boarding Facilities | 10 | Main Urban Area | 690 | 8% | 79% | 0% | 9% | 0% | 1% | 2% |
| Unit | Tara | • **Age Adventure** | Private : Fully Registered | Composite | | | Main Urban Area | 93 | 8% | 83% | 0% | 9% | 1% | 0% | 0% |
| No-Unit | Brent | | State | Secondary (Year 9-15) | | 8 | Main Urban Area | 2017 | 14% | 54% | 9% | 19% | 2% | 0% | 2% |
| No-Unit | Claire | • **Working Title** | State | Secondary (Year 9-15) | | 9 | Main Urban Area | 2105 | 10% | 75% | 2% | 9% | 3% | 1% | 1% |

In Table 6-1, **School Definition** The empty cells in this column are defined as "Not Applicable" in the New Zealand Ministry of Education (MoE) database**.**

All **Total Roll** numbers are from the 2022 MoE Schools' directory website, https://www.educationcounts.govt.nz/directories/list-of-nz-schools, except for the 'Urban farming outreach' Unit, which Daniel supplied directly by email. No Decile data was available for Daniel and Tara's schools.

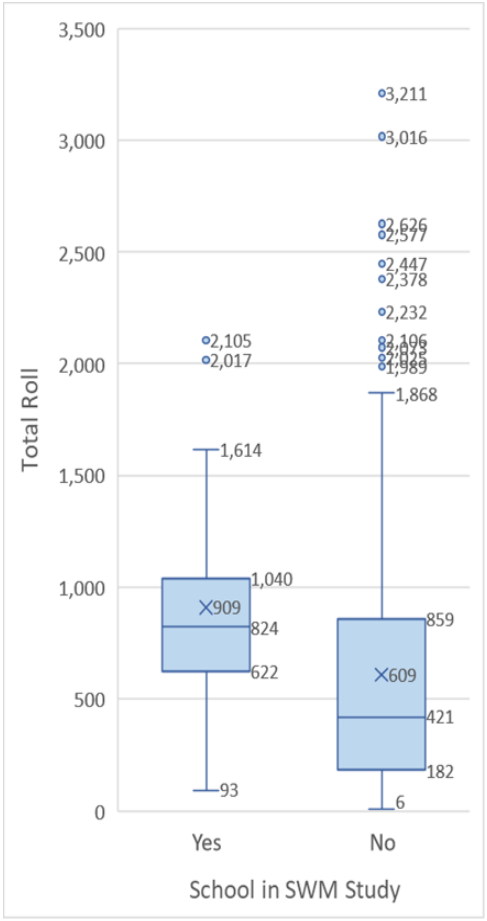
**MELAA** stands for Middle Eastern, Latin American and African.

## 6.2.3 The Study Schools Compared to All-Other New Zealand Senior Secondary Student-Inclusive Schools

### *6.2.3.1 School Roll*

The Study schools' median Total Roll (824) is substantially above that of the All-Other schools (421) as shown in Figure 6-1. This is more likely to be a research design effect than due to any connection between school Total Rolls and their teachers' interest in Sustainable Wellbeing education. As a consequence of the direct self-selecting participant recruitment process for this study, teachers from larger schools were more likely to be included than those from smaller schools and this effect alone could explain the higher median of the Study schools. As can be seen in Figure 6-1, the All-Other schools' Total Roll distribution is strongly skewed upward and this skew, although less extreme, is also apparent in the Study schools' Total Roll distribution. Upward skew means the spread of Total Roll values in the top half of schools (ordered by Total Roll) is greater than in the lower half pushing their mean value above their median.

*Figure 6-1 School-level Total roll comparison for the 22 Study schools with the 505 All-Other senior-secondary-student-inclusive schools.*




While the Study school rolls are substantially higher than the All-Other schools, school rolls as experienced by the students are very similar in the two groups and for the same participant recruitment process reason. The median Total Roll experienced by students in the Study schools is 1,027 compared to 1,039 in the 505 All-Other schools. As far as school size is concerned then, the Study schools are representative of senior secondary student-inclusive schools in New Zealand.

### *6.2.3.2 Gender*

The number of Girls-only schools in the Study group (6) is more than double what would be expected from their numbers across the country as a whole, as shown in Table 6-2. The probability of this bias occurring purely by chance is just 4.6% based on the Fisher Exact test (2-tailed) for contingency tables (Crewson, 2016). Co-Ed schools (14) are 20% underrepresented while Boys-only schools (2) are equally represented in both the Study and All-Other groups.

The ratio of female to male students is estimated to be 58:42 over the whole Study group compared to 50:50 in the —assuming the Co-Ed schools have equal numbers by gender on average. The difference in these proportions between the Study and All-Other groups of 8% is significant with 95% confidence

*Table 6-2 The proportions of Co-Ed, Boys, and Girls schools in the Study and All-Other groups of secondary student-inclusive schools*

| | Study Schools (22) | All-Other Schools (505) | Total (527) |
|---|---|---|---|
| Co-Ed | 64% | 81% | 80% |
| Boys | 9% | 9% | 9% |
| Girls | 27% | 11% | 11% |
| **Total** | 100% | 100% | 100% |

### *6.2.3.3 Ethnicity*

Of the Total 327,642 students in the 527 senior secondary student-inclusive schools, 48% identify as European/Pākehā, 24% as Māori, 15% as Asian, 9% as Pacifika and 5% as other ethnicities. The corresponding proportions for the Study and All-Other groups of schools are shown in Table 6-3. At first glance, it appears that European/Pākehā students may be significantly overrepresented in the Study Schools group and this is confirmed by closer inspection of the relevant distributions.

*Table 6-3 Total Student population Ethnic proportions across the 527 senior secondary student-inclusive schools and within the Study and All-Other groups of schools*

| | Study Schools | All-Other Schools | Overall |
|---|---|---|---|
| European/Pākehā | 60% | 47% | 48% |
| Māori | 20% | 24% | 24% |
| Asian | 10% | 15% | 15% |
| Pacifika | 7% | 9% | 9% |
| Other Ethnicities | 3% | 5% | 5% |
| **Total** | 100% | 100% | 100% |

The median school ethnicity proportions for the Study and All-Other groups are shown in Table 6-4, along with the overall proportions from Table 6-3 for comparison. Each median is presented with its 95% Informal Confidence Interval (ICI), (Wild et al., 2017; Wild, Horton, et al., 2011; Wild, Pfannkuch, et al., 2011).

The only statistically significant difference between the groups is in their median proportion of European/Pākehā students—63% for the Study schools and 49% for the All-Other group. The probability of an overrepresentation this large occurring by chance was found to be very low, lying between just

1.6% and 3.6% with 95% confidence[11] using bootstrap resampling. The two-tone colour scale in Table 6-4 relates to the size of the median, with blue for the highest and red for the lowest value.

*Table 6-4 Median School Ethnic Proportions for the Study schools and All-Other schools*

| | Overall population proportion | Median School Ethnic Proportion | |
|---|---|---|---|
| | | Study | All-Other |
| European/Pākehā | 48% | 63%<br>**54% to 71%** | 49%<br>**45% to 52%** |
| Māori | 24% | 18%<br>10% to 26% | 23%<br>20% to 26% |
| Asian | 15% | 6%<br>4% to 8% | 5%<br>4% to 6% |
| Pacifika | 9% | 3%<br>1% to 4% | 3%<br>2% to 3% |
| MELAA | 2% | 1.6%<br>1% to 2% | 1.2%<br>1% to 1% |

The Study and All-Other groups' distributions by European/Pākehā school ethnicity proportions are compared in Figure 6-2. The corresponding comparison for Māori is shown in Figure 6-3. While the school European/Pākehā proportion distributions are skewed downward, the Māori proportion distributions are skewed upward as are all the minority school ethnicity distributions. For European/Pākehā this means the bottom half of schools by proportion are further below their median than the top half are above while the opposite holds for Māori, Asian, Pacifika, and MELAA distributions. The upward skew in the distributions of schools by Māori proportion would be more extreme if it were not for the tendency of Māori students to attend smaller schools. While the proportion of all other ethnicities (especially European/Pākehā) tends to increase with school size, the proportion of Māori in these 527 New Zealand schools tends to decrease at a rate of 26% per 1,000 students (See Appendix D-1.1.3, Figure D-3). This negative correlation with total roll size accounts for 20% of the total variation in school Māori student proportions and can be seen as a reflection of the unique position of Māori as tangata whenua (literally 'people of the land') in this country's educational ecosystem.

[11] The rerandomization method does not require that the compared distributions be normal but does not produce the same result on every run. To produce the range of estimates quoted, as a 95% confidence interval, each comparison was run 30 times and the normal standard error of the mean formula was applied to those results.

*Figure 6-2 Comparison of the proportion of students that identify as European/Pākehā in the Study and All-Other schools.*

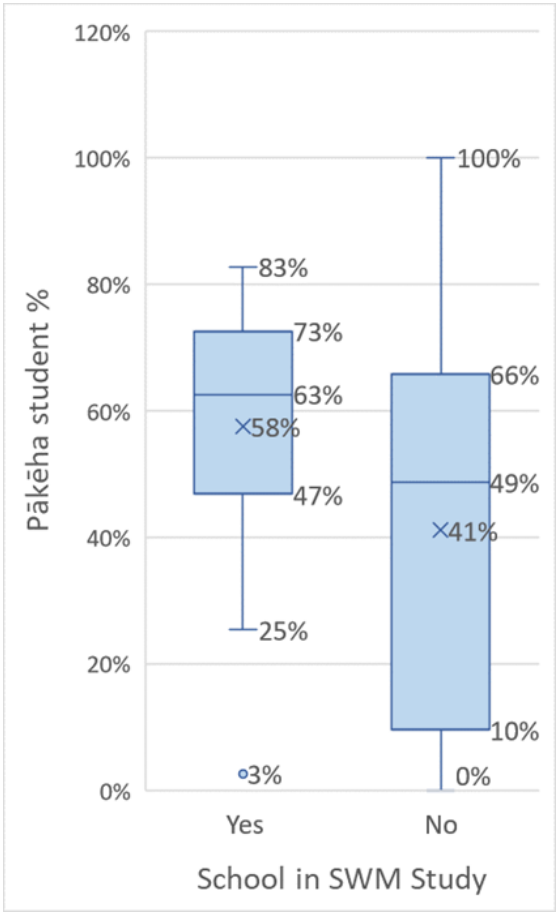
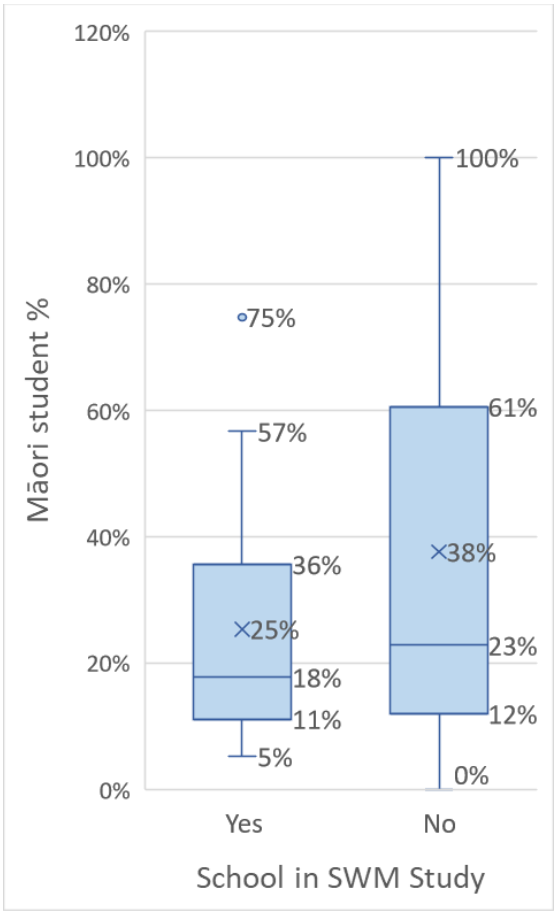



*Figure 6-3 Comparison of the proportion of students that identify as Māori in the Study and All-Other schools*




### *6.2.3.4 Decile*

The mean socioeconomic decile of the study schools as a whole is 6.4 compared to 5.1 for the general population of All-Other schools and this difference is statistically significant at the 95% confidence level. The mean deciles experienced by students are higher in both groups at 7.0 and 6.2, indicating an upward skew in the decile distributions relating to higher deciles in larger schools. However, the difference between these student-level means is not statistically significant due to the greater skew toward larger schools in the All-Other group.

### *6.2.3.5 School Character*

Seventy percent of the senior secondary student-inclusive schools in Aotearoa New Zealand, with 76% of the total enrolled student population in these schools, come under the 'authority' of the State, as

distinct from State-Integrated, and Private school authorities. In its directory of New Zealand schools, the MoE also classifies schools by authority, type and school definition. A school's 'type' depends on the age range of its students. Composite schools cater for all ages from kindergarten to year 13 senior students. Three other school types cater for various ranges of year levels from year 7 up to year 15. School 'definition' includes categories such as "Designated Character School" and "Kura Kaupapa Māori" or Māori medium immersion schools (Kura). These are both minority categories comprising just six and nine percent respectively of the secondary student-inclusive schools and 2.1% and 2.4% of their students. No teachers from Kura Kaupapa Māori schools volunteered to participate in this study.

To better understand the individual character of the Study and the Study-Unit schools and the situations of the teachers who contributed to this research, I created a composite binary categorisation variable—School Character—for the 527 secondary student-inclusive schools based on these three MoE classifying fields. 'Mainstream Secondary' I defined as School Authority = "State", School Type = "Secondary (Year 7-15, or 9-15, or 11-15)", and School definition = "Not Applicable". The remaining schools were categorised as 'Special Character'. A key distinction here is the age range of students in each school type. The minimum age of students in 'Mainstream Secondary' schools is year 7 whereas the minimum age in 'Special Character' schools is at most year 7 and often as low as year 1 or preschool (K). While the Mainstream Secondary/Special Character distinction usefully simplifies the statistical analysis it also masks the variabilty of school types within the Special Character aggregation. Table D-5 and Table D-6 in Appendix D-1.1.5 are provided to give the reader some appreciation of this variability and how it is related to the numbers of schools and students in the Study and All-Other groups. The Study group included schools from all three of the main groups of school Authority; Private: Fully Registered, State: Integrated, and State.

Among the 22 Study schools, the proportion of 'Mainstream Secondary' schools was significantly higher and the proportion of 'Special Character' was significantly lower (93% confidence) than in the All-Other schools group, where 'Special Character' schools predominate as shown in Table 6-5. The proportion of students in 'Mainstream Secondary' schools was also much higher among the Study schools than in the All-Other schools group, as shown in Table 6-6 although this finding follows given that the mean Total Roll overall for Mainstream schools is 883 compared to just 453 for the 'Special Character' schools.

*Table 6-5 Comparison of the numbers of Study and All-Other schools by School Character*

| | **Study schools (22)** | **All-Other schools (505)** | **Total (527)** |
|---|---|---|---|
| **Special Character** | 41% | 61% | 61% |
| **Mainstream Secondary** | 59% | 39% | 39% |
| **Total** | 100% | 100% | 100% |

*Table 6-6 Comparison of the proportions of students in the Study and All-Other schools by School Character*

| | Study school Students (20,001) | All-Other school Students (307,641) | Total Students (327,642) |
|---|---|---|---|
| **Special Character** | 30% | 45% | 44% |
| **Mainstream Secondary** | 70% | 55% | 56% |
| **Total** | 100% | 100% | 100% |

### *6.2.3.6 Urban-Rural location*

Rural schools are underrepresented in the Study group of schools (14% compared to 33% for the All-Other schools) but this outcome cannot be separated from the effect of the research design recruitment strategy which favoured the participation of teachers from larger schools. The median Total roll for the three Rural schools in the Study group (734) is substantially higher than the median for Rural schools in the general All-Other group (225). The underrepresentation of rural students in the Study schools (10% compared to 17% for the All-Other schools) is thus also inconclusive.

### *6.2.3.7 NCEA and University Entrance Attainment*

The potential tension between the SWM's goals and maintaining academic achievement was mentioned as a concern by seven of the 23 participants at various points of the study—particularly that the SWM's cross-curricular component would constrain University Entrance (UE) attainment. Data on 2022 NCEA Level 2 and University Entrance results obtained from the New Zealand Qualification Authority (NZQA) shows that the differences in cumulative attainment rates between the Study and All-Other schools were not statistically significant for either of these qualifications. The median NCEA Level 2, year 12 (aged 16) student cumulative attainment rate was 86% for the Study schools and 81% for the All-Other schools. The corresponding median University Entrance cumulative attainment rates were 52% and 44%. (NCEA level 2 is typically achieved by students in year 12 and UE in year 13, but students can qualify earlier for either, and 'cumulative' refers to the total number of students who have qualified by the end of the given year level). Qualification attainment rates are not correlated with Total School rolls so the school attainment rates experienced by students are distributed in a way very similar to those of the schools themselves with similar medians.

### *6.2.3.8 Summary re representativeness*

The study's self-selection participant recruitment process meant that larger schools with more teachers had a greater probability of being included simply by chance. This effect complicated inferences about schools' potential interest in the Sustainable Wellbeing Metacurriculum proposal being related to other demographic characteristics which are also correlated with school size such as school character and urban-rural location (special character and rural schools are both smaller on average than Mainstream

Secondary and Urban schools and both were also underrepresented in the Study group). The Study schools are representative of New Zealand senior secondary student-inclusive schools in general in that their Total rolls as experienced by the median student are similar at around 1,030. Attainment rates for NCEA Level 2 and UE are also statistically equivalent. The study schools however had a statistically significant higher proportion of female students, despite the association of girls-only schools with smaller total rolls than boys-only schools. The study schools had a significantly higher socioeconomic decile rating of 1.3 points on a ten-point scale and deciles were not correlated with school size. The study schools also had significantly higher proportions of European/Pākehā students compared to all other ethnicities. No differences in proportions for other individual ethnicities were found, however, it is noteworthy that the proportion of Māori students in Aotearoa New Zealand schools is the only ethnic proportion negatively correlated with school size meaning that Wharekura Kaupapa Māori schools (schools where all or some of the students are taught predominantly in Te reo Māori) were likely to underrepresented in this study. There were just two such schools in the study group, one where 7% and the other where 4% of the students were so taught (data from NZ Ministry of Education, 2024a).

## 6.2.4 Comparing the Unit with the Non-Unit Study Schools

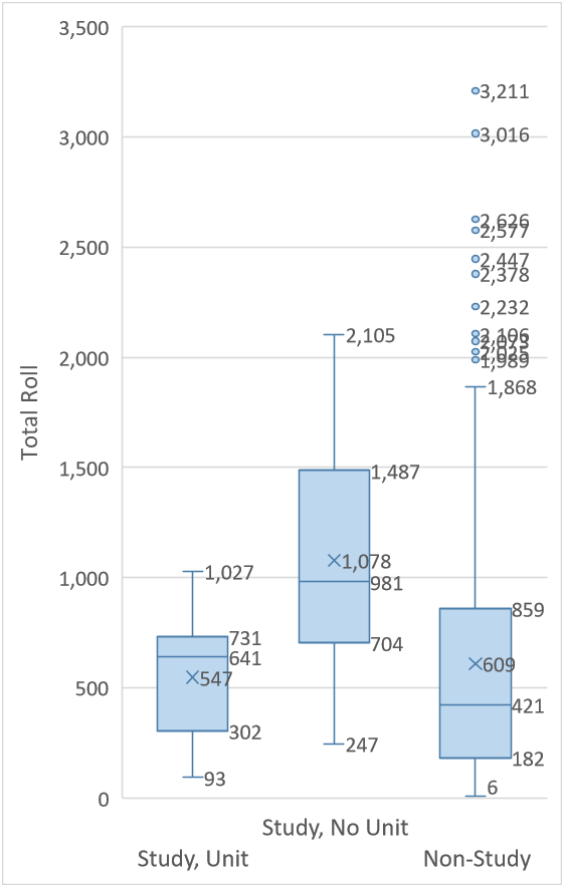
### *6.2.4.1 School Roll*

As shown in Figure 6-4, within the Study schools, the seven Unit and fifteen No-Unit schools form two distinct groups. The Unit schools are characterised by a median Total Roll of 641 substantially below that of the fifteen No-Unit schools median of 981. The Unit schools' Total Rolls range from just below 100 to just over 1,000 students and the distribution is skewed downward, unlike the No-Unit and All-Other group distributions which are dominated by a few very large schools and hence upwardly skewed. This upward skew means that most students are attending schools much larger than the median school (by total roll).

At the individual student level, the median student experienced roll for the Study group as a whole is 1,027 and statistically equivalent to that for the All-Other majority, as reported in Section 6.2.3. The Unit and No-Unit schools, however, have distinct median student experienced rolls of 690 and 1,360 respectively, and this substantial difference is statistically significant at the 95% confidence level despite the small sample sizes.

For the Unit schools then, the median student experience of Total school Roll is very similar to the median school Total Roll, which is not the case in either the No-Unit or All-Other school groups. These findings suggest that there may be key

*Figure 6-4 School level Total roll comparison for the 7 Study-Unit; 15 Study-No Unit and 505 All-Other (Non-Study) senior-secondary-student-inclusive schools.*



factors related to Total roll size that enable schools of between 100 to 1,000 students to more easily transition toward an SWM than either larger or smaller schools. However, the majority of students in Aotearoa New Zealand, are enrolled in the larger schools with rolls of over 1,000.

#### *6.2.4.2 Gender*

The school gender type imbalance noted in Section 6.2.3 for the Study group affects both the Unit and No-Unit groups as shown in Table 6-7, so the relative proportions of school types are not much different. Two of the larger Unit schools, however, are girls-only and there are no boys-only schools in this group. This means the gender imbalance in favour of girls—estimated at 72:28—is greater in the Unit group schools than it is in the Study group as a whole (58:42), and while the bias is less in the No-Unit group it still favours girls 55:45. The margin of difference in these ratios of 17% between the Unit and Non Unit groups is substantial and statistically significant with 95% confidence.

*Table 6-7 The numbers of Co-Ed, Boys-only, and Girls-only schools in the Unit, No-Unit, and All-Other groups of secondary student-inclusive schools*

| Snr. School Gender | Study-Unit (7) | Study-No Unit (15) | All-Other (505) |
|---|---|---|---|
| Co-Ed | 71% | 60% | 81% |
| Boys | 0% | 13% | 9% |
| Girls | 29% | 27% | 11% |
| **Grand Total** | 100% | 100% | 100% |

#### *6.2.4.3 Ethnicity*

The overall ethnic proportions contrast between the Unit and Non-Unit groups of schools, shown in Table 6-8, like the gender contrast, is also striking but here the Unit group is more representative of the general population. The overrepresentation of European/Pākehā students in the Study group as a whole is increased in the No-Unit group while the Unit schools are similar to the All-Other schools. Pacifika students appear however to be underrepresented in the No-Unit and overrepresented in the Unit group of schools.

*Table 6-8 Student Total Ethnic Proportions by Study Group*

| | Overall | Unit | No-Unit | All-Other |
|---|---|---|---|---|
| European/Pākehā | 48% | 44% | 63% | 47% |
| Māori | 24% | 24% | 19% | 24% |
| Asian | 15% | 9.1% | 10% | 15% |
| Pacifika | 9.1% | 19% | 3.9% | 9.3% |
| MELAA | 2.5% | 2.0% | 1.8% | 2.5% |

Table 6-9 shows the median School ethnic proportions and their 95% Informal Confidence Intervals for the three groups of schools. The two-tone colour scale again relates to the size of the median, with blue for the highest and red for the lowest value. The only two statistically significant contrasts between groups in the table have been shown in a larger and bolded font. The higher median school proportion of European/Pākehā students already noted for the Study group schools increases to 65% in the No-Unit group but becomes insignificant in the Unit group as a consequence of its lower median but also its small sample size and the spread of proportions within this group.

*Table 6-9 Median School Ethnic Proportions by Study Group (with 95% informal Confidence Intervals). The statistically significant differences are shown in bold large font.*

| | Overall population proportion | Median School Ethnic Proportion | | |
|---|---|---|---|---|
| | | Unit | No-Unit | All-Other |
| European/Pākehā | 48% | 53%<br>28% to 78% | **65%**<br>**58% to 71%** | **49%**<br>**45% to 52%** |
| Māori | 24% | 21%<br>8% to 34% | 18%<br>9% to 26% | 23%<br>20% to 26% |
| Asian | 15% | **8.6%**<br>**7.5% to 9.7%** | **4.5%**<br>**2.2% to 6.8%** | 5%<br>4% to 6% |
| Pacifika | 9% | 1%<br>0% to 5% | 3%<br>1% to 4% | 3%<br>2% to 3% |
| MELAA | 2% | 1.6%<br>1% to 2% | 1.6%<br>1% to 2% | 1.2%<br>1% to 1% |

The other significant contrast in the table is between the Unit group and both the other school groups. The former has a significantly higher median Asian student proportion at 8.6%, than either the No-Unit or All-Other schools, both at around 5%. Inspection of the distributions of Asian student proportions in these two groups reveals that despite the overall proportion being slightly lower in the Unit group, the students are more evenly distributed across the seven schools which leads to the relatively high median proportion for this group. In the No-Unit group, most of the Asian students are enrolled at just three of the fifteen schools with the other twelve schools having relatively small Asian student proportions.

#### *6.2.4.4 Decile*

While the Study schools as a whole have a higher mean decile than the All-Other majority, as seen in Section 6.2.3, there is no significant difference between the Unit and No-Unit schools' mean deciles at either the whole school or the individual student levels. However, this finding should not be interpreted as suggesting that socioeconomic decile rating is unrelated to interest in an SWM or commitment to education for Sustainable Wellbeing. Two of the largest Unit schools have deciles of just 3 and 4 and are the schools where Nicola and Deb were teaching at the time they provided their Units 'Self-watering

planter boxes' and 'Harsh Summer' respectively. These two schools differ from the other five Unit schools for their relatively low level of support for these teachers' interest in Sustainable Wellbeing education as was noted in Section 5.3.

#### *6.2.4.5 School Character*

As noted in Section 6.2.3, 'Special Character' schools are substantially underrepresented and 'Mainstream Secondary' schools are overrepresented in the Study group as a whole. The Unit and No-Unit Study schools also split strongly along lines of school character but in the opposite sense. The Unit schools have a substantially higher proportion of 'Special Character' schools, as shown in Table 6-10. while the No-Unit schools are mainly larger Mainstream Secondary schools. The association between these Unit groups and School character was significant according to the Fisher Exact test for contingency tables there being only a 7.4% chance of such a distribution occurring by chance. The proportion of students in Special Character schools was also slightly greater for the Unit than the No-Unit schools, as shown in Table 6-11, against the trend in both the No-Unit and All-Other groups. This association could be described as 'moderate' according to the Cramers-V statistic for contingency tables (Crewson, 2016).

'Special Character' schools that prioritise Sustainable Wellbeing principles in their kaupapa may be in the minority amongst the general population of schools, but those that do, it would seem, are more committed to these principles than even the most supportive 'Mainstream Secondary' schools. Again, Nicola and Deb's schools are important being the only mainstream schools in the Unit group.

*Table 6-10 Comparison of the proportions of Study-Unit and Study-No Unit schools by School Character*

| Number of Schools | Unit (7) | No Unit (15) | All-Other (505) |
|---|---|---|---|
| **Special Character** | 71% | 27% | 61% |
| **Mainstream Secondary** | 29% | 73% | 39% |
| **Total** | 100% | 100% | 100% |

*Table 6-11 Comparison of the proportions of students in the Unit and No-Unit schools by School Character*

| Number of Students | Unit (3,826) | No Unit (16,175) | All-Other (307,641) |
|---|---|---|---|
| **Special Character** | 53% | 25% | 45% |
| **Mainstream Secondary** | 47% | 75% | 55% |
| **Total** | 100% | 100% | 100% |

#### *6.2.4.6 Urban-Rural location*

While there is no apparent association between the Study status of schools (Study or All-Other) and their Urban-Rural location, the situation is less ambiguous when comparing the Unit schools with the No-Unit schools. All three Rural schools in the study belong to the No-Unit group. When considering the number of students involved this result is statistically significant. The association of Rural Schools with the No-Unit group can be described as 'moderately strong' using Cramer's-V statistic. The possibility that their rural location and community political factors influenced the underrepresentation of rural schools in the final SWM Study-Unit group cannot be ruled out. The three teachers from those schools consistently evaluated the emerging SWM framework positively and one, Bronwyn, explicitly mentioned local rural community resistance to sustainability issues. In the second Delphi survey round, she responded to the request for "Community factors that could constrain Local Community support for a Sustainable Wellbeing Metacurriculum in our School" with the comment, "Connecting students and community geographically. Some conservative views about environmentalists - we are a farming community that usually votes Blue! [sic]"

#### *6.2.4.7 NCEA and University Entrance Attainment*

As found for the Study schools as a whole, the NZQA Data on 2022 NCEA Level 2 and University Entrance results shows that there are no significant differences in cumulative attainment rates between the Unit and the No-Unit schools, for either of these qualifications. The spread of attainment rates, however, is notably less in the No-Unit group than in either the Unit or the All-Other group. Both the highest and the lowest qualification attainment rates amongst the Study schools are in the Unit group (one school had no available NCEA attainment data), which is surprising given that there are only seven schools in this group). This observation again underscores the diversity of the schools in the Unit group of the emerging paths toward Sustainable Wellbeing education.

#### *6.2.4.8 Summary comparing Unit and Non-Unit schools & students*

The Study schools are separated by the Unit, No-Unit categorisation into two distinct groups by their average values in all these demographic fields apart from mean Decile, and NCEA attainment, although for both these variables the Unit group is distinguished by its broader spread of values across schools. The seven Unit schools are more like the general population of All-Other schools in terms of their smaller median Total Roll but less like the All-Other schools in terms of their gender bias toward girls which is even more extreme than for the Study schools as a whole, and their location bias toward urban and away from rural schools. The Unit schools are also more like All-Other schools In their ethnic proportions profiles while the No-Unit schools have a substantially higher proportion of European/Pākehā students. The Unit schools have a substantially higher proportion of 'Special Character' schools compared to Mainstream Secondary and of students in those schools despite the greater roll size of the latter. This is in direct contrast with the Study schools as a whole compared to All-Other schools.

### 6.2.5 Questions for discussion

Several important questions for further exploration arise out of this demographic analysis including:

- Why does the ideal total school roll for enabling the introduction of sustainability and wellbeing-centred education appear to be around 700 and mainly in the range of 100 to 1,000 when much smaller and larger schools abound across the country?
- Given that half of all students in senior secondary student-inclusive schools are in schools with total rolls of 1,039 or more, how might the reach of sustainability and wellbeing-centred education and the SWM be improved to include those students?
- Why are male students so underrepresented in the schools most committed to education for sustainability and wellbeing and what can be done to engage more Boys-only schools and male students generally in Sustainable Wellbeing education?
- European/Pākehā teachers and students were overrepresented among the participants in this study and the student ethnicity profiles of the participants' schools. To what extent is this a reflection of this study's recruitment strategy and the researcher's ethnically restricted social networks? This ethnic bias was less apparent among the Core Participants' schools suggesting that the effect is indeed a research design problem rather than an ethnicity-sustainable Wellbeing correlation effect.
- Socioeconomic decile does not appear to be a significant factor in the occurrence of education for sustainability and wellbeing projects and courses in schools but may be a factor in the readiness of school leadership teams to consider innovative whole-school approaches to education for Sustainability and Wellbeing, both within the curriculum and in campus management and administration practices. To what extent and in what ways does a lack of material resources in a school constrain an SWM-type transformation and are there cost-effective ways of overcoming these hurdles?
- Why did so many Mainstream Secondary school teachers show initial interest in this research project centring education for sustainability and wellbeing but then fail to persevere through to its conclusion?
- Is the strong and explicit values base underpinning the educational approach and embedded in the curriculum of 'Special Character' schools and of the practice of the teachers that participated in this study a key factor in their capacity to provide a Sustainable Wellbeing-directed curriculum?
- How important is the wider range of student ages in 'Special Character' schools in maintaining and reinforcing their Sustainable Wellbeing values?
- How might the SWM framework be developed and promulgated in ways that are acceptable to and useful for rural communities?
- What role does academic achievement in general, and NCEA qualifications in particular, have in a metacurriculum that centres Sustainable Wellbeing, given that the median NCEA qualification attainment rates among the Study-Unit schools compare favourably with both the No-Unit and All-Other group medians but also exhibit extreme variability?

An in-depth discussion of all these questions is beyond the scope of this thesis but some observations relevant to the first two around Total School Rolls are worth making here. Several teachers commented during their interviews on how the size of their school roll limits their capacity to offer students cross-curricular sustainability and wellbeing units. Brent spoke about the upper limits on school size arising in years 11 to 13 from the demand for specialist courses restricting timetabling options. Anita, who provided the 'Education for Sustainability' and 'Āhuarangi Climate' Units, teaches in a small composite co-ed school with a roll of just under 650 students. She sees the lower limits that the total school roll sets on the staffing expertise available for sustainability education. When I asked Brent about extending his school's year 9 and 10 cross-curricular programme to the three senior years 11 to 13, he replied:

> Only for those core subjects. .., because it becomes … very specialised. .... Plenty of our senior boys particularly want to do, like two technologies, and they're doing very specific stuff there. … at quite a high level. Which, … steps away from that cross-curricular element.

I suggested that advanced technologies could still be focused on sustainable future projects and Brent agreed in principle but felt it would be far easier at smaller schools:

> You could certainly thread it through…. Where this works particularly well, I think [is in] smaller schools. My friend is the principal down at [a small rural, decile 1, Co-Ed] College, two or three hundred kids, and you know, that this sort of stuff works really well, because .. they can have an independent program. Every senior student … could be working on just four or five big projects, and it's encompassing.

He seems to be assuming here that the reason smaller schools might be more able to offer students cross-curricular programmes is that such programmes must be individualised. Other timetabling possibilities exist, as was observed in Section 5.3. For instance, teachers can design a cross-curricular programme with a specific focus, like sustainability and wellbeing, that large groups of students engage with either as a special subject option, learning pathway or as a required curriculum component for all students at the school. Individualised student projects can then be built into the units of which the programme is comprised. In light of the demographic contrasts noted earlier, and specifically the question about ethnic homogeneity within schools enabling sustainability and wellbeing education, it's worth noting that the smaller college Brent is referring to is a Special Character, decile 1 school with a majority 76% Pacifika, 21% Māori, and 2% minority Pākehā-European student roll.

Anita's concern about the small size of her school was expressed initially as an observation about her lack of economics knowledge when we were talking about the types of action projects that students chose in her 'Education for Sustainability' course. When I asked if she felt like she had all the necessary resources, Anita replied:

> Yeah, I do. I struggle sometimes when I get to teach topics I'm not familiar with, like economics. Like, where's the economics for the person [who] doesn't know much about it? So there's a lot of trawling through the internet, trying to pull bits out,

I asked if there was anyone else on the staff she could call on and her answer was:

> No. We have, I suppose we're quite small. But, also, it's like people are teaching traditional economics. So where do I go and find the economics I should be teaching? … Business studies is a bit better because I noticed …, they often have to have ... something social underlying their businesses …. And something to do with something cultural as well. So, they seem to be a bit more with the times.

The lack of specialist expertise in a small school does not seem to be so much the problem here as the lack of sustainability-oriented expertise. Similar concerns were expressed by Mathew who provided the Unit outline for 'Business Studies Level 2' (see Section 5.3.2). He saw timetabling and the availability of specialist teaching expertise as constraining (for a school of just 442 students) in providing for the specialised topics some of the students undertook in their individual, potentially cross-curricular, 'Impact projects':

> Also, a challenge, if we head that way, is making sure we've got those specialist staff who can …, moderate the work and make sure it gets the merit grade or whatever it

> deserves. And timetabling them to those particular students that want to do that. So we haven't gone there yet.

Anita's observation about the social issues consciousness of Business Studies as a subject is also borne out by the SWM Unit 'Business Studies Level 2' provided by Mathew. The NCEA Business Studies standards that Mathew references do indeed contain explicit culturally aware references to "Māori business concept(s)" (standard 90844 Busn Studs EAS 2.2: Demonstrate understanding of how a large business responds to external factors) and in one instance to a "community well-being focus" where "Well-being refers to improving the social, mental or physical health of a community or improving community cohesion" (standard Busn Studs IAS 2.6: Carry out, review and refine a business activity within a community context with guidance). In 2022 standard 90848 was replaced in this course by the level 3 standard Busn Studs IAS 3.6: Carry out, with consultation, an innovative and sustainable business activity, which requires "evaluating the business activity" and explains that: "Evaluate involves measuring the performance of the business activity relative to desired economic, social, cultural (including ethical), and environmental outcomes." Allowance for "integrating a Māori business concept(s) where relevant to the business activity" is also included in this standard.

Consistent with this study's finding that the teachers who have successfully introduced Cross-Curricular Holistic SWM-like units are working mainly in Special Character schools, Nicola made the following observation when referring to her Mainstream Secondary school colleagues' disinterest:

> It's an inherent problem in all schools, you know, because I've taught overseas as well. And it's, it is a problem in all schools, private [Special Character] schools are more likely to take on board those sorts of ideas to be honest. But that is my concern about the whole wellbeing curriculum. How do you break down those barriers and make people feel comfortable doing something completely different?

## 6.3 Enabling and Constraining Change Toward a Sustainable Wellbeing Metacurriculum

### 6.3.1 Section Overview

In the first round of the Delphi Survey, I included a group of questions asking the participants to comment on factors that they felt enabled, constrained or would need to change to implement a Sustainable Wellbeing Metacurriculum for years 11 to 13 students. These questions were considered separately at three levels, the school, the local community, and the nation. In this section, I take each of these levels in turn and compare the responses of the nine Core Participants to these questions with those of the thirteen Non-core Participants. At each level, I treat the enabling and constraining factors as a single aggregated group and compare those factors with the participants' priorities for change. The set of factors at each level was formed by aggregating a longer list of themes. The numbers attached to each factor represent the number of times the themes were mentioned by participants in response to the separate component questions. In some cases, similar themes were mentioned as both enabling and constraining, in their absence, by the same participant and have been counted twice as an acknowledgement of 'strength of feeling'. It is possible that participants just assumed that if, for instance, 'teacher enthusiasm' was mentioned as Enabling, that implied its absence was Constraining. For consistency, I decided not to second-guess that assumption and to take participants at their explicit wording. 'Teacher enthusiasm' could, after all, be high or low across the school or high amongst some staff and low with others.

### 6.3.2 School Level

*Enabling and Constraining Factors*

Figure 6-5 compares the nine Core Participants' views about the factors enabling and constraining an SWM implementation in their school, with those of their thirteen colleagues who did not contribute to Phase 3 of the study.

**Teacher enthusiasm** was the most frequently mentioned factor overall and the most important issue for the Non-Core teachers both as an enabler and as a constraint when absent. Under Enabling factors, Amber wrote "a lot of collaborative, creative teachers" and Holly listed "Other teachers being on board/sharing the load". Under Constraints, Megan wrote, "Goodwill/fatigue. [Our] College has undergone significant changes in the last six years and a surge in student numbers." For two of the Core teachers, Lack of Teacher Enthusiasm was also a potential constraining factor. Anita thought possible resistance could arise from an SWM requiring "a big reorganisation of staff and resources" and from "staff reluctance to change".

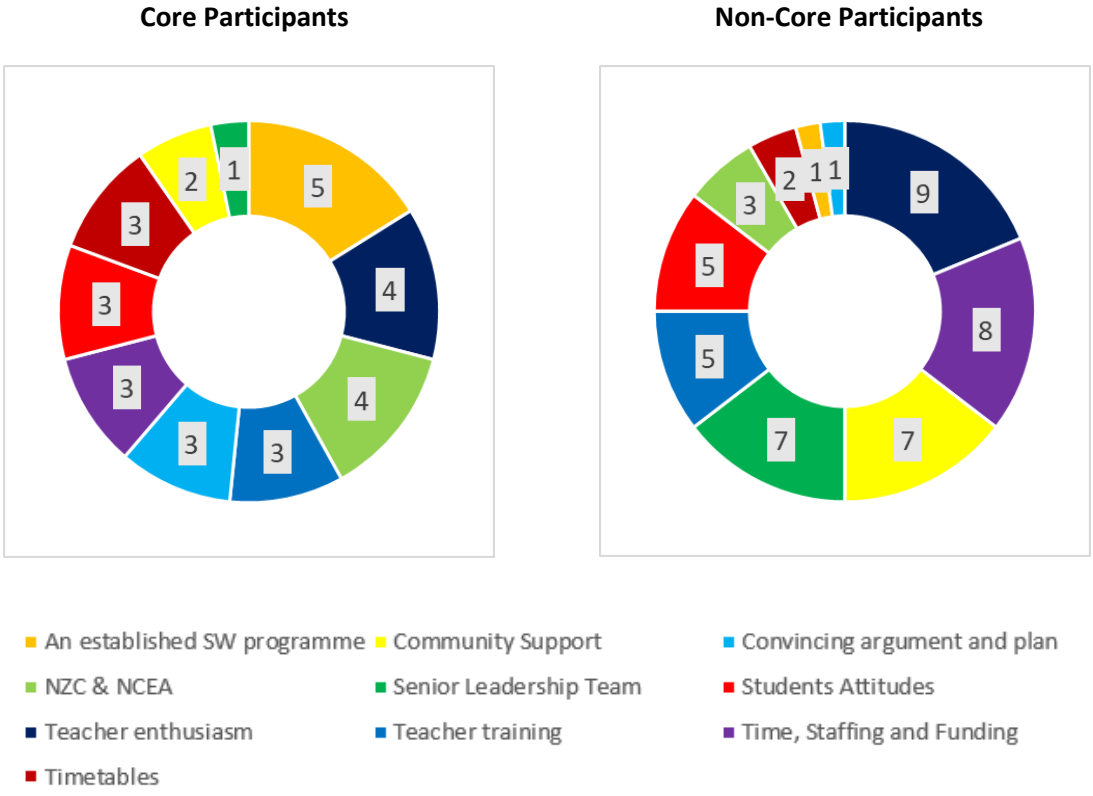
However, that the Core Participants' school group may be at a different stage of a journey toward Sustainable Wellbeing (SW) education is apparent from the contrast in the other most-mentioned factors. Those most frequently mentioned by the Core Teachers are least mentioned by the Non-Core teachers, and vice versa. Five of the Core Participants, Brent, Mathew, Nicola, Rebecca, and Tara, all commented on the importance of their schools' **Established SW programmes** for enabling further Sustainable Wellbeing development. Success, it seems, breeds success. Enabling for Nicola were:

> Successful past projects that resulted in students gaining NCEA Levels 1,2 and 3 as a result of this type of learning, increasing [the] number of credits gained but also

increasing engagement of students with low expectations of their own academic ability.

Rebecca wrote, “With a wellbeing programme in place and Global Living from Year 7, I feel we do not have too many constraints”. As noted in Section 5.3.10, ‘Global Living’ was renamed the year following this first Delphi Survey, to become the ‘Te Ara’ programme.

*Figure 6-5 Factors that Enable and Constrain the implementation of an SWM within Participants’ Schools showing the number of mentions for each factor.*




The New Zealand Curriculum (NZC) (NZ Ministry of Education, 2007) and National Certificate of Educational Achievement qualification, **NZC and NCEA** along with (lack of) **Teacher enthusiasm** were the next most mentioned issues for the Core Participants considered as a constraint to the progress of an SWM. Daniel for instance wrote, “How it [the SWM] might be seen as idealistic and unrealistic to prepare young people for the workforce.” The Non-Core teachers were less concerned about qualifications and had an optimistic view of the potential of the government’s current Review of the NCEA Achievement Standards to improve the outlook for an SWM. Stephanie for instance wrote, “This is a time of change in the secondary curriculum area, so this could provide an environment where sustainability could be incorporated more easily”.

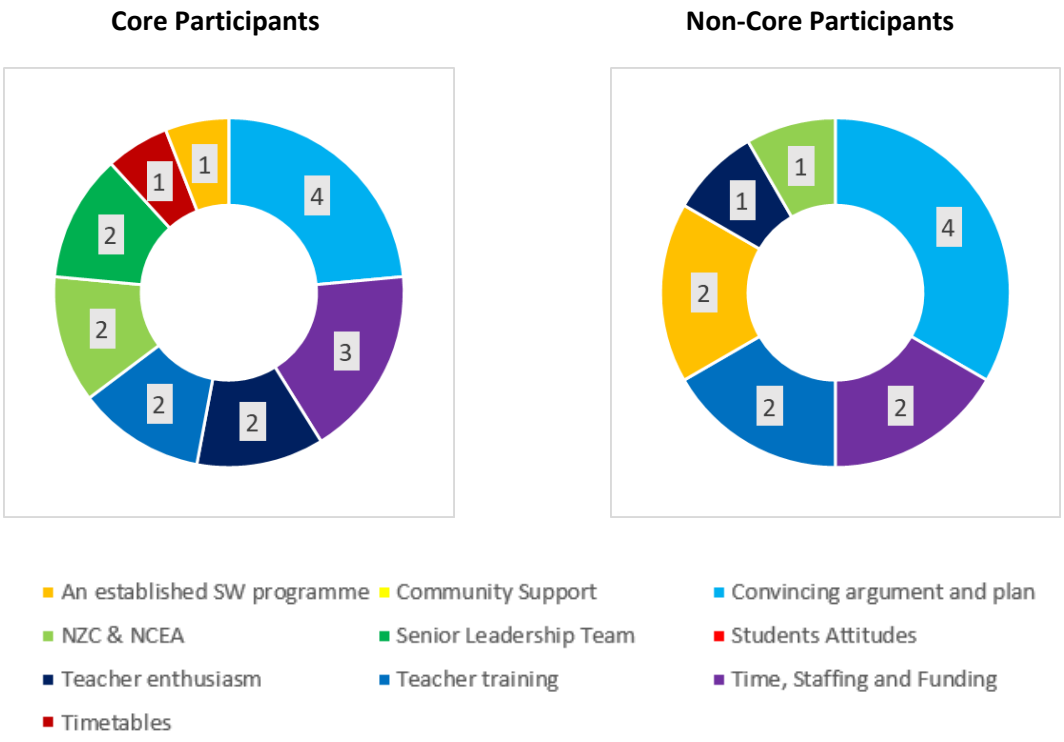
Inadequate Resourcing in the form of **Time, Staffing and Funding** was the second biggest issue for the Non-Core teachers. For the Core participants Time, Staffing and Funding ranked fourth equal along with **Insufficient Teacher training**; Negative **Student Attitudes** (Mathew and Deb); the lack of a **Convincing argument and plan** for transformation; and the challenge of creating **Timetables** to accommodate cross-curricular courses.

The lack of **Senior Leadership team** support, and lack of **Community support,** were the third equal most important factors for the Non-Core teachers, just behind inadequate resourcing. The Core Participants were much less concerned about these factors, although Anita noted that the Senior Leadership team and student support could not be taken for granted and Mathew made a similar comment about "Student staff and community buy-in".

*Factors Needing to Change*

Figure 6-6 presents the factors that participants felt would most need to change to enable the implementation of an SWM in their schools. Here we see a high level of consensus between the Core and Non-Core Participant Teachers, with the top two ranked factors being the same for both.

*Figure 6-6 Factors that would need to Change within Participants' Schools to Enable the implementation of an SWM showing the number of mentions for each factor.*




The factor labelled **Convincing argument and plan** includes suggestions relating to: systemic change affecting the physical campus; the social structures and mindset of the school as an institution; and all stakeholders' capacity for culture change. Anita wrote, "Staff and management would need to be convinced it was a great idea". Bridget suggested a "Practical, clear curriculum". Megan wrote:

> The staff at [our] College are an impressive bunch (as this is my 12th school, I feel I can say this). If they can see the how, why and that they would be supported, they would be up for the challenge.

Sufficient **Time, Staffing and Funding** to plan and make the changes required by an SWM was the second most mentioned Change factor followed by the provision of **Teacher training**. The four comments were,

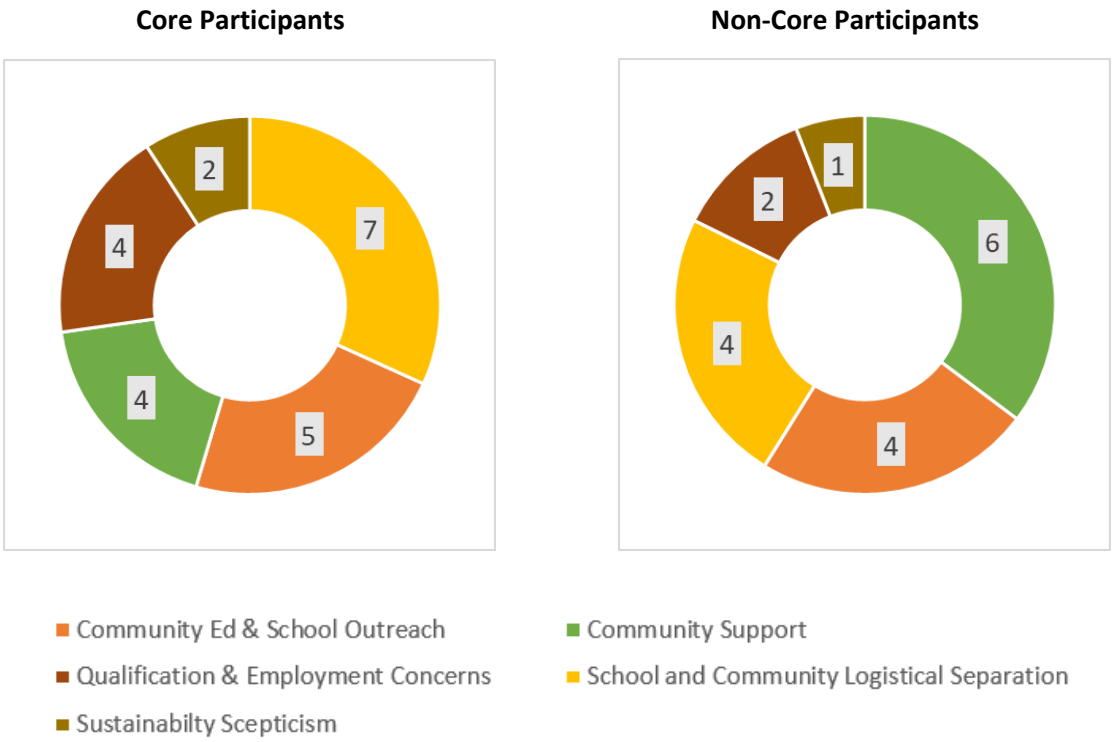
“Huge amounts of PD around teachers’ capabilities to effectively teach the affective domain well”, “More PD for staff or student senior leaders who could pass on knowledge.”, “Ongoing training and support for the teachers”, and “PD for staff to enable them to teach it”, from Daniel, Rebecca, Bridget, and Bronwyn, respectively.

### 6.3.3 Community Level

*Enabling and Constraining Factors*

Figure 6-7 compares the Core and Non-Core Participants' views about the factors enabling and constraining an SWM implementation in their local Community. The top three factors are the same for both participant groups. The most mentioned factor by the Core group and overall was **School and Community Logistical Separation.** The most mentioned by the Non-Core group and second overall was **Community Support**. **Community Ed & School Outreach** was ranked second by both and third overall.

*Figure 6-7 Factors that Enable and Constrain the Implementation of an SWM within Participants’ Local Community showing the number of mentions for each factor.*




Under **School and Community Logistical Separation**, three teachers saw the geographic separation between their school and student communities as a connection challenge. Nicola’s comment typifies this concern:

> The distance between school and home communities and the fact that our students come from all over [the city]. Strategies to teach students how to build connections to their learning in collaboration with their local community would be needed. Flexible learning programmes could support this.

Four teachers commented on the cost in time and money of making and developing community connections. Rebecca expressed frustration with the administrative constraints involved in taking students off the school site:

> We are part of a substantial river clean-up project, growing native trees onsite and offsite …, river monitoring and other environmental initiatives. However, the paperwork every time students go offsite is substantial, so if this was easier, it would enable more of these projects!

Teachers in both groups, especially the Non-Core group saw **Community Support** as the key enabling factor. Although their schools may not have progressed as far toward implementing an SWM, these teachers are by no means less enthusiastic. Gemma wrote, "The school has a well-being focus that they are looking to develop further—and we have strong links to our community who would support this idea". Holly's comment was "Lots of community groups keen to get involved and support the school" and Stephanie mentioned, "The resources and community groups we currently have contact with such as the Enviroschools network".

Under **Community Ed & School Outreach,** the constraining factors mentioned included the Community's lack of understanding of an SWM, combined with no, poor, or negative public presentation of Sustainability and Wellbeing education. Conversely, positive, expert and proactive communication would be an essential enabling factor as Megan expressed it:

> Providing all community stakeholders with the opportunity to fully understand what a SWM is about and the potential for it to make a positive difference for each ākonga and our future generations. .. Whānau, employers, community groups etc understanding why a SWM is important at a local, national and global level.

Lucy emphasised the importance of "Consultation [and] clear communication re: purpose". Daniel suggested, "More education around the pros of this new approach, with key community figures endorsing it."

*Factors Needing to Change*

As shown in Figure 6-8, **Community Ed & School Outreach** was also the factor most frequently mentioned by the Core Participants as necessary for change. In response to this question, Nicola wrote:

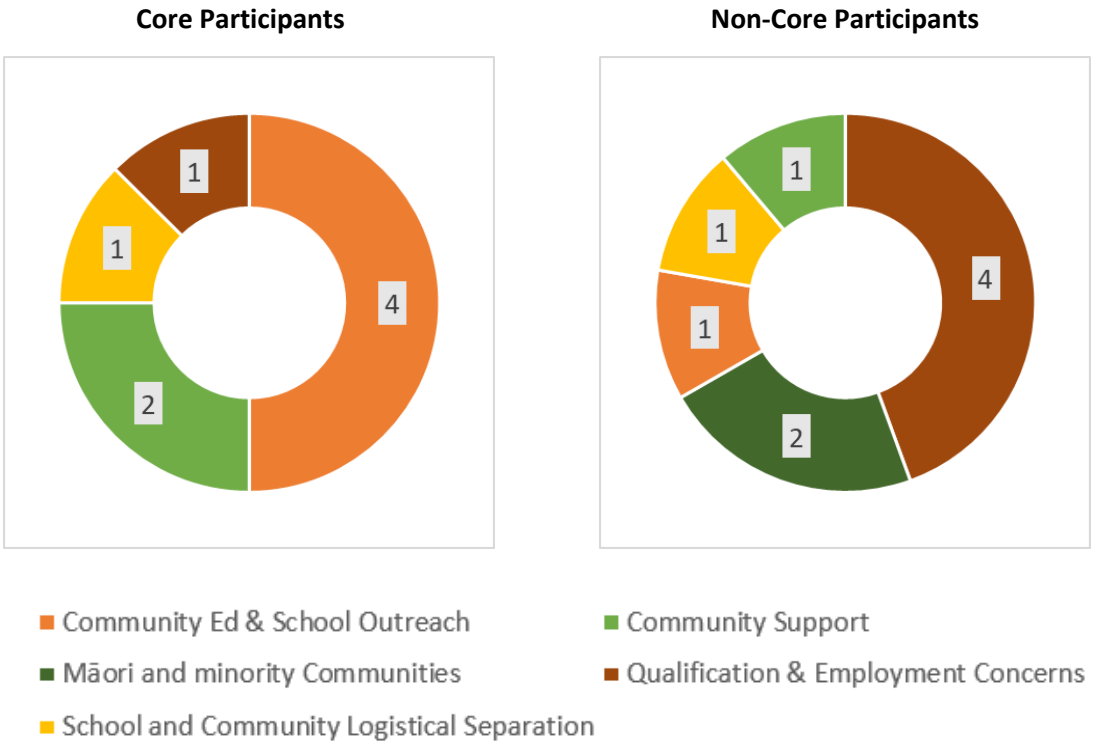
> Effective ways of sharing knowledge between school and the multiple communities we are linked to. This could start with one project that is generic enough to be adapted to multiple community projects. With our gardening project, we were able to share our processes with other schools who used this as a basis to develop their own sustainability project through shared connections with the tertiary provider we collaborated with.

Although the **Qualification & Employment Concerns** factor was hardly mentioned by either group as a Community-level Enabling or Constraining factor, for the Non-Core group it was the most important factor that needed to change. This factor includes the idea of providing a persuasive direction found at the School level and is closely related to **Community Ed & School Outreach**. Typical teacher comments included, "The community really trusting the school to create a robust curriculum that is as much academic as getting students world-ready as decision-makers"; "evidence of importance - and success in other settings - indications of positive outcomes"; and "the mindset of many Europeans may pose a

difficulty, if they feel their student's ability to achieve NCEA may be threatened" from Amber, Gemma, and Lucy, respectively.

Amber and Lucy also mentioned connecting with **Māori and Minority Communities** as change related to supporting an SWM. Lucy wrote, "There are many Maori in our community who would see the benefit, so no change there.".

*Figure 6-8 Factors that would need to change within Participants' Local Communities to Enable the implementation of an SWM showing the number of mentions for each factor.*




## 6.3.4 Nationwide Societal Level

*Enabling and Constraining Factors*

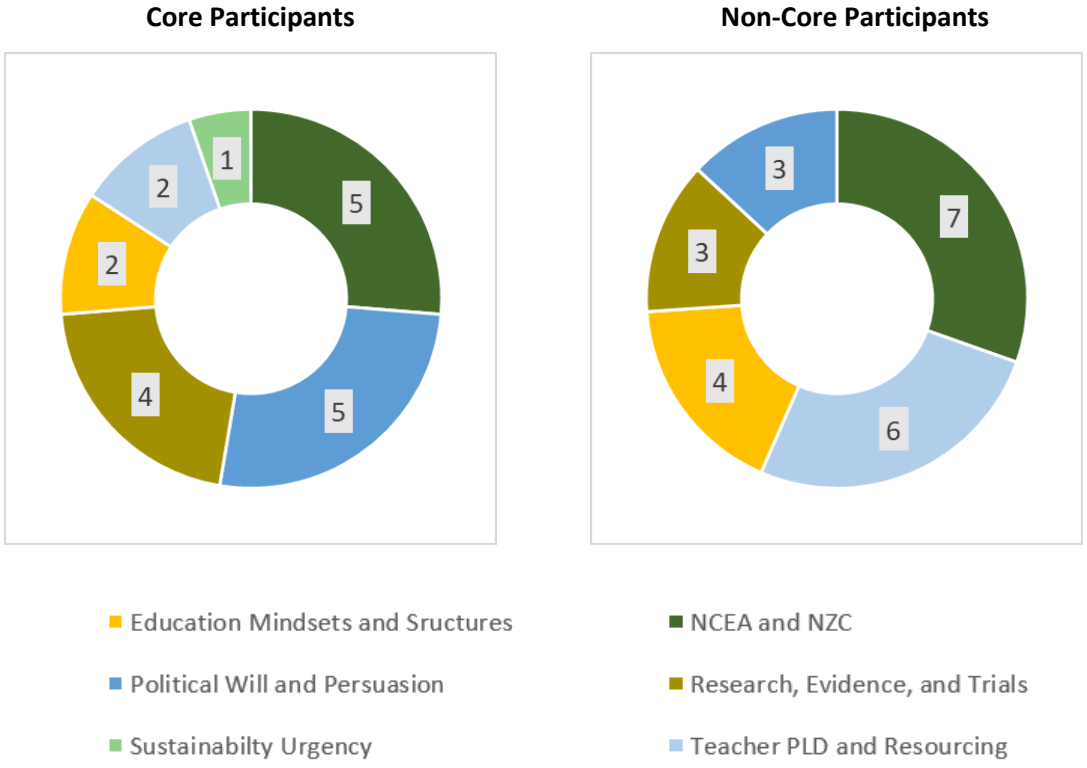
Figure 6-9 shows the number of mentions for each factor that participants view as Enabling or Constraining the implementation of an SWM at the nationwide level in New Zealand. '**NCEA and NZC'** was the most mentioned factor overall both as enabling and constraining, by both the Core and Non-Core Participants. Among the Core participants, Tara felt positive about the "Forthcoming reviews of NCEA and NZC" and Brent about the potential for teachers to "Build on the lifelong learning focus in the curriculum". Among the Non-Core teachers, Bridget felt like Tara about the NCEA review, Amber appreciated the flexibility of the NCEA standards-based assessment and Bronwyn noted "Environmental sustainability is at the start of the curriculum under future-focused—so, in theory, it is already in the current curriculum". Holly and Megan felt that NCEA could be adapted to better serve an SWM. As Megan expressed it "Specific Achievement Standards would need to be constructed, resources made and trialled, and exemplars produced to support staff and students.".

This lack of current SWM-supportive Achievement standards was also noted by Nicola from the Core group, who saw as constraining:

> The current systems for teaching and reporting results against stand-alone subject-based outcomes rather than on standards achieved as part of a collaborative project that uses standards assessing skills such as critical thinking, learner agency and self-integration.

Brent and Lucy both noted parent and student concerns about an SWM undermining opportunities for gaining NCEA credits and qualifications as constraining. Rebecca saw teacher fatigue from coping with the current and ongoing NZC and NCEA reviews as constraining, while Gemma observed, "The main aspects of curriculum/NCEA changes have already been cemented – [it] may be too late for more changes?"

*Figure 6-9 Factors that Enable and Constrain the implementation of an SWM within New Zealand nationally showing the number of mentions for each factor.*




The overall second equal most mentioned factors were **Political Will and Persuasion** and **Teacher PLD and Resourcing**, both of which were also priorities at the School level. The former was more frequently mentioned by the Core Participants. Their views centred around the instinctive conservatism of mainstream political parties and the need to make a persuasive case for transformative change. As Anita wrote:

> Political buy-in. Perhaps there is evidence in schools here or overseas that such a curriculum 'creates' students better able to function in and contribute to their communities, take action on climate change, and be healthier in all ways.

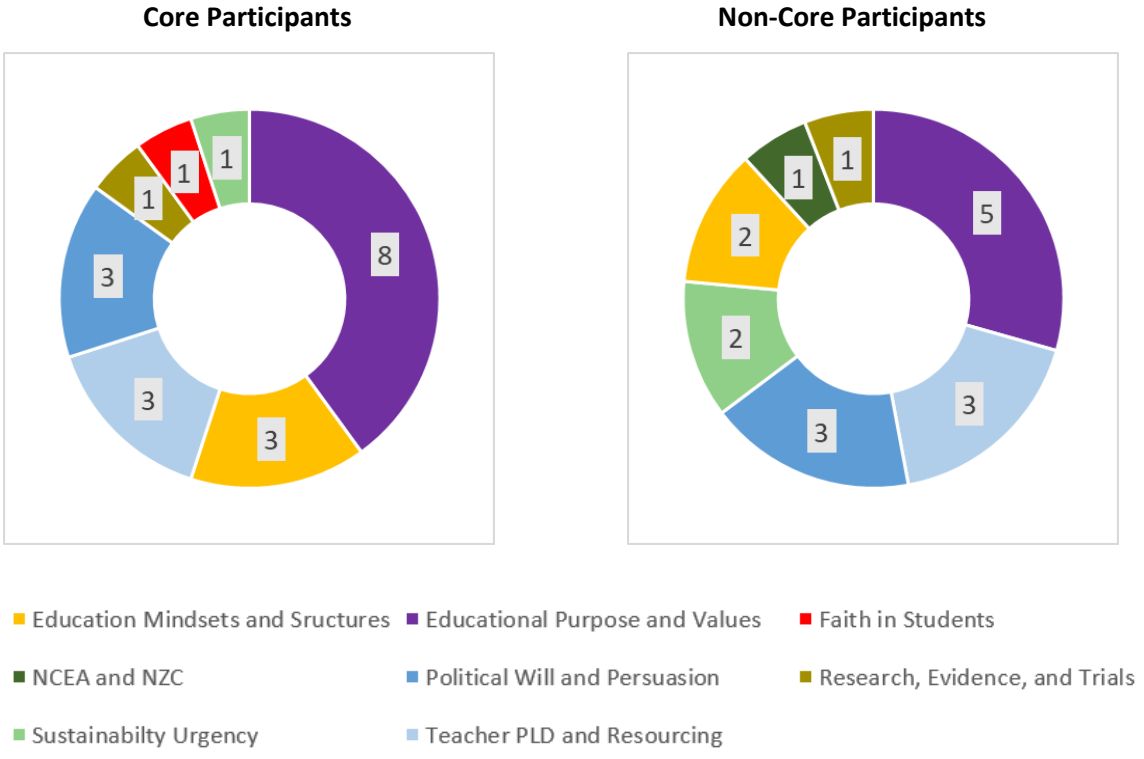
The Non-Core teachers' politically-oriented suggestions included “Making sustainability and wellbeing a compulsory part of the New Zealand Curriculum” from Stephanie and making a case for an SWM based on the facts of current environmental crises, as Gemma wrote, “to respond to [the] negative impacts of Covid/climate anxiety could be compatible with CCC [the Climate Change Commission] goals”.

*Factors Needing to Change*

**Political Will and Persuasion** and **Teacher PLD and Resourcing** also ranked second equal for both groups of participants, among things that would need to change at the Nationwide level, to Enable the implementation of an SWM in New Zealand secondary schools (see Figure 6-10). Bridget addressed realistically the practical implications for teachers. She wrote:

> The assumption that teachers are able and willing to whip up these new concepts quickly and easily [would need to change]. Teachers need to be expected to be given the time during working hours to upskill, create/source new resources, plan their curriculum and differentiate for the diverse needs of their students.

*Figure 6-10 Factors that would need to Change within SWM within New Zealand nationally to Enable the implementation of an SWM showing the number of mentions for each factor.*




However, the most mentioned Change factor across both groups of teachers was **Educational Purpose and Values**. This factor did not appear at all among the Enabling and Constraining Factors, while the **‘NCEA and NZC’** factor which was important there, is hardly mentioned as a priority for National Societal transformation toward an SWM for secondary schooling.

This question evoked the most passionate responses from teachers expressing their personal and professional ideals, aspirations and frustrations. Some had no doubts about the values that should be paramount in education. Others called for a public reconsideration and conversation about the purposes of education in our place and time. Among the Core participants, Nicola had an intergenerational perspective:

> It is time for equity in education to enable all individuals to achieve to their full potential while looking after the planet in a way that enables future generations to have access to the resources required for them to thrive.

Daniel had a similarly global view, writing, “Values [need to change] i.e a big shift in secondary [education from] getting ready for the workforce/uni to holistic education”. Brent, Tara and Claire also saw a need for a shift away from an overemphasis on academic outcomes but viewed this as compatible with the needs of modern business and industry. They stressed the need for public education to achieve this values shift. Brent called for a “Deeper understanding of how students learn and the importance of capabilities and wellbeing” and a change in “University entry requirements”. Claire had a similar view but also observed, “Then you'll have a group of people who believe this metacurriculum is being too soft”. Anita’s take on the necessary change was political and consultative. She suggested:

> If the population were given a say on what 'education' is and what is important in education, and this was reflected in what you propose, then perhaps you would get people to vote in a party for educational change.

This position neatly illuminates the political tension between following and leading, which must be navigated by aspiring transformative educators.

The Non-Core participants expressed their call for greater clarity, based on their perception of great uncertainty throughout society about the purposes of secondary school education and the need for a new public consensus. Amber wrote:

> There are concerns about readying students for the workforce when we don't know what that will look like (let alone society or the environment!). There seem to be gaps and misunderstandings between students, schools, parents, higher education, [and] workplaces—about what they want and need.

Gemma thought the changes required would involve, “more explicit links [between] societal goals and links to education”, and a shift in mindset away from education being viewed as purely vocational toward a greater emphasis on citizenship. Bridget suggested, “a clear focus on how we expect our young people to achieve success”. Lucy succinctly expressed the needed change in terms of the fundamental human dilemma that the SWM seeks to address writing, “[In] a world that is so highly connected—we have never been more disconnected."

### 6.3.5 Summary

In Table 6-12, I summarise the factors most mentioned in this study by the participants as Enabling-Constraining the implementation of an SWM for Secondary Schools in New Zealand, and the Changes most needed to support that transformation. The table also compares the Core and Non-Core teacher groups with the overall most mentioned factors at each of the three levels; school, local community, and nationwide.

*Table 6-12 The most mentioned factors Enabling-Constraining and needing to Change to support the implementation of an SWM for Secondary Schools in New Zealand, at the individual School, Community, and National Societal Levels.*

| | | Core Participants | Non-Core Participants | Overall |
|---|---|---|---|---|
| **School** | | | | |
| | **Enable-Constrain** | Established SW programmes | Teacher enthusiasm | Teacher enthusiasm |
| | **Change** | A Convincing argument and plan for systemic change | A Convincing argument and plan for systemic change | A Convincing argument and plan for systemic change |
| **Community** | | | | |
| | **Enable-Constrain** | School and Community Logistical Separation | Community Support | School and Community Logistical Separation |
| | **Change** | Community Ed & School Outreach | Qualification & Employment Concerns | Community Ed & School Outreach |
| **Nation-Societal** | | | | |
| | **Enable-Constrain** | NCEA and NZC | NCEA and NZC | NCEA and NZC |
| | **Change** | Educational Purpose and Values | Educational Purpose and Values | Educational Purpose and Values |

## 6.4 Exploring the 'SWM Space'

### 6.4.1 The SWM Attractor Pioneers

Underlying my main research question is the 'SWM Attractor' analogy that pictures the Sustainable Wellbeing Metacurriculum concept as an attractor configuration within the complex landscape of formal educational possibilities and as a sustainable alternative to the unsustainable existing Business as Unsustainable (BaU) configuration. Exactly what the SWM configuration looks like is as yet only vaguely apparent, but the analogy maintains that those schools and teachers who are imagining and working toward their version of Sustainability and Wellbeing education are exploring and mapping the space of this attractor configuration. The character of the SWM ideal for each school will necessarily be place-based but is also likely to point the way toward the key features of the national and maybe global forms of the system configuration that I have called the Sustainable Wellbeing Metacurriculum.

As we have seen in sections 6.2 and 6.3, the teachers who volunteered for this study, and their schools, fall into two distinct groups which I have named the Core and Non-Core participants. Eight of the Core participants provided rich data about the paths of practice they and their schools have followed in their exploration of the 'SWM Space'—including complete SWM Unit outlines from seven of the teachers as detailed in sections 5.3 and 5.4. The analysis of this section is based on these eight Study schools. In Section 5.3.12 I listed eight school-level factors which appeared most relevant to the 'SWM Attractor' analogy. Eventually, synthesising all that I had learned about these schools and the SWM framework

that had emerged from the co-construction process, I extended this list of factors from eight to nineteen.

Based on these nineteen factors I subjectively ranked the eight schools, as described in Section 3.6.4.2, in terms of how closely the SWM whole school conception and the SWM framework appeared to align with their practice. The resulting SWM attractor proximity ranking of the schools, based on their mean factor scores, is presented in Table 6-13. The schools are identified by the name of their contributing teacher and the SWM Units or cross-curricular programs each provided. Using the statistical technique of Principal Components Analysis (PCA) allowed me to reduce the nineteen rank-related factors to five principal components which together characterise the region of the educational system in which these schools are moving.

The top five ranked schools could be described as being on trajectories that explore the full range of pedagogical possibilities afforded by our current BaU configuration of education. They could be described as the first responders to the SW crisis in education and pioneers of the SWM space. In terms of the SWM Attractor analogy, using the Lorenz strange attractor image introduced in Section 2.3.4.2, these five schools are on trajectories in the light blue zone of the attractor illustrated in Figure 2-2A. The left and right basins of attraction in this attractor represent the CCH and SBS modes respectively, of the schools' curricula, pedagogies, assessment methods, and timetables. The bottom three schools in Table 6-13—the large Mainstream secondary schools—remain restricted to orbiting the SBS basin, even though teachers within them like Deb and Nicola are independently exploring CCH and SW-oriented pedagogies. However, Brent's school and others like it such as Claire's, I suggest, could well be close to finding a workable tipping point trajectory—perhaps by adopting the SWM framework co-constructed in this research—that would take them into the light blue zone of the attractor. For each school that finds its tipping point, the nation's schooling system attractor would shift a little closer to the SWM configuration illustrated in Figure 2-1 and potentially to a sector-wide phase change tipping point.

Three important caveats are attached to the interpretation of these rankings. First, I stress that although the teachers' names are used to identify the schools, it is the schools and not the teachers that are being ranked here. Nicola for instance, is an experienced and highly qualified Sustainable Wellbeing educator. She was simply working in an institutional environment with little affinity for CCH team teaching and project-based education. Second, it should be noted that as the researcher, my subjective judgement of where the hypothetical SWM attractor lies, and the factors upon which its form should be understood has throughout this study been and will continue to be under constant review. Third, my use of a ranked table is primarily a matter of presentational convenience. It is not meant to imply the existence of some linear scale that can accurately determine proximity to the attractor for schools treated as independent entities. The 'landscape' in which the attractor lies is multi-dimensional and complex in that the relationships among entities and the landscape itself are mutually constitutive. The top three schools in the table are, for instance, all involved in inter-school collaboration arrangements that support their Sustainable Wellbeing goals through shared resources and expertise—the top two with one another.

*Table 6-13 The eight Principal Component Analysis (PCA) Case Study schools ranked in descending order of proximity to the SWM attractor. NA means "Not Available".*

| Rank | School | SWM Units for years 11 to 13 | Cross-Curricular timetable elements | School Type | Decile *[12] | Total Roll | NCEA Level 2 Pass Rate | UE Pass Rate | School fees per student per year | Notes re. fees |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Rebecca's | Te Ara year 12 | Te Ara, Hui time, Assembly | Special character | 10 | 690 | 99% | 96% | $27,400 | 2023 Tuition Fees for Years 9 to 13 |
| 2 | Anita's | Education for Sustainability Āhuarangi Climate | Hapori. Built into both these Units | Special character | 7 | 641 | 52% | 40% | $0 | State integrated school |
| 3 | Daniel's | Urban farming outreach | Built into this Unit | Special character | *2 | 162 | NA | NA | $0 | $575 per Short Courses: 1-4 students 2-4 days (meet the funding criteria of STAR and Gateway Govt schemes). |
| 4 | Mathew's | Business Studies Level 2 | Impact projects | Special character | 6 | 442 | 83% | 67% | $932 | Attendance dues for Secondary students: (Years 9-13) |
| 5 | Tara's | AGE Adventure | Built into this Unit | Special character | *10 | 93 | 44% | NA | $29,100 | 2023, Years 10-13 + Enrolment fee $750.00 |
| 6 | Brent's | (No Unit provided) | Year 9-10 Innovation Stream | Mainstream secondary | 8 | 2,017 | 86% | 62% | $300 | Voluntary annual donation request |
| 7 | Nicola's | Self-watering planter boxes | Collapsed classroom (as required) | Mainstream secondary | 3 | 1,027 | 93% | 74% | $0 | State-funded school |
| 8 | Deb's | Harsh Summer | Built into this Unit | Mainstream secondary | 4 | 771 | 87% | 39% | $0 | State-funded school |

[12] These decile ratings are inferred from conversations with the teachers and not based on the Minitry of Education's official decile ratings.

### 6.4.2 Academic credibility and socio-economic ranking

Maintaining the academic credibility of schools while also prioritising Sustainable Wellbeing and CCH pedagogy was a concern mentioned by teachers in this study. The NCEA level 2 and University Entrance attainment rates for 2022 shown in Table 6-13 demonstrate that there is no necessary conflict between these two goals (confirming the findings of sections 6.2.3 and 6.2.4). The four lowest-ranked schools have relatively high attainment rates, but the first-ranked school is also first in attainment rates.

Affordability is another issue sometimes raised in association with Green and Eco-schools, the educational values of which the SWM proposal has much in common. High-profile private schools such as the Green School New Zealand, Green School Bali, and Green School South Africa charge substantial tuition fees (Martin, 2020). There is also, however, a thriving worldwide Green and Eco-schools movement in state-funded schools exploring more affordable pathways toward sustainability education (Gough et al., 2020; Plevyak, 2022; Sharma et al., 2019), including the Enviroschools organisation in New Zealand (Eames & Mardon, 2020). The measures of socioeconomic accessibility I have included in Table 6-13 in the form of School decile ratings and school tuition fees per student per year show that the same range of education affordability is evident amongst these eight SWM study schools and appears uncorrelated with SWM proximity. 'Tuition fee' expressly refers to monies charged or expected of parents over and above the standard costs of school uniforms, stationery, course-related activities, etc. These standard costs can vary enormously even between State-funded schools (Stock, 2023) and are not included in the table. There is some indication that higher socioeconomic status is favourable for movement toward the SWM attractor, but it is not a necessary condition. Although the three lowest-ranked schools also have the lowest level of fees, so does the second-ranked school. Similarly, the highest decile schools are not all at the top nor the lowest at the bottom.

### 6.4.3 Principal Component Analysis

There was a high degree of correlation among the nineteen factors upon which the eight Sustainable Wellbeing Metacurriculum attractor proximity rankings were based. Using Principal Component Analysis (PCA) the nineteen factors were reduced to five distinct principal components that together explain 97% of the total variance in factor scores. The five principal components are shown in Table 6-14 with the proportion of variance they explain and their associated factors in descending order by strength of correlation. The effect of each principal component on the SWM attractor proximity ranking of schools was determined using multiple linear regression with the five components as the independent variables.

'People, Programmes, Practices, and Place' is the label I've given the first principal component, PC1. PC1 explains 36% of the total factor score variance and comprises eight of the nineteen factors. 'People', in this label, includes students, teachers, the local community, and community sustainability educational provider groups. Schools high on this component encouraged student voice in curriculum development and expected students to take on roles of age-appropriate leadership. They structured timetables to enable CCH team teaching programmes for Sustainable Wellbeing involving a wide range of learning areas, had access to land for gardens and conservation activities, and relied on the sustainability expertise of community organisations to extend their Ecosphere education to projects outside the classroom. They gave priority to on-campus sustainability practices and the domains of Sustainable Wellbeing featured significantly in their stated school values.

*Table 6-14 Principal Components and Factors correlated with the eight Principal Component Analysis (PCA) schools' SWM attractor proximity rankings. The % of Total Factor score variance 'explained' by each component is shown beneath its descriptor. Three percent of the variance remained 'unexplained'. Factor 3.3 is highlighted in red because it is negatively correlated with its principal component.*

| Component | Factor |
|---|---|
| **PC1** People, Programmes, Practices, and Place<br><br>**36%** | 1.1 the value placed on nurturing student voice in school life including curriculum development;<br>1.2 the range of Subjects and year levels involved in CCH Sustainable Wellbeing Units;<br>1.3 the extent of and structural support for CCH team teaching at all year levels in the school;<br>1.4 the strength of community relationships and links with community organisations supporting the School's SWM;<br>1.5 the use of mentoring, portfolios and self-reflection for student competency development;<br>1.6 commitment to on-campus & local environmental sustainability practices;<br>1.7 alignment between the school's values and Sustainable Wellbeing;<br>1.8 the extent of Ecosphere-related learning and (Education Outside the Classroom) EOTC activities across subjects and year levels; |
| **PC2 Disciplinary Breadth in the Social and Cultural Subdomains**<br><br>**18%** | 2.1 the extent of Social Justice related learning and EOTC activities across subjects and year levels;<br>2.2 the extent of Cultural Vision related learning and EOTC activities across subjects and year levels;<br>2.3 the range of Subjects and year levels incorporating Sustainable Wellbeing subdomains in their SBS Units, |
| **PC3 School Leadership for Sustainable Wellbeing**<br><br>**17%** | 3.1 the practice of Sustainable Wellbeing-oriented core curriculum requirements for all students;<br>3.2 the extent to which the Sustainable Wellbeing curriculum elements extend into year 11 to 13 classes;<br>3.3 the emphasis placed on Students choice and Subject options; |
| **PC4 NCEA for Sustainable Wellbeing with Project-Based Learning**<br><br>**16%** | 4.1 the use of NCEA Credits to recognise students' Sustainable Wellbeing achievement;<br>4.2 the timetabled provision for CCH, student-led project-based learning in the timetable;<br>4.3 alignment between the school leaders' values and the teachers' values; |
| **PC5 Mātauranga Māori and inter-School Collaboration**<br><br>**10%** | 5.1 the strength of Mātauranga Māori and multi-cultural awareness and inclusion in the school;<br>5.2 the strength of Sustainable Wellbeing Collaboration with other schools |

Rebecca's, Anita's, and Tara's schools, in that order, all scored positively on this component. Deb's, Mathew's, Nicola's, and Daniel's schools all scored negatively but for quite different reasons related to different strengths and weaknesses across this PC's eight factors, which are explored further in Section 6.5. The eight schools in SWM proximity rank order—each identified by its study participant's name—are shown in Table 6-15 along with their relative scores for each of the five principal components. Positive scores are coloured green and negative scores red.

*Table 6-15 Principal Component scores for each of the eight Principal Component Analysis (PCA) schools identified by its Study Participant. The PC scores are colour-coded green for positive correlations with Rank and red for negative correlations.*

| Component | | PC1 | PC2 | PC3 | PC4 | PC5 |
|---|---|---|---|---|---|---|
| School Participant | Rank | People, Programmes, Practices, and Place | Disciplinary Breadth in the Social and Cultural Subdomains | School Leadership for SW | NCEA for SW with Project-Based Learning | Mātauranga Māori and inter-School Collaboration |
| Rebecca | 1 | 1.55 | 0.79 | 0.79 | -1.32 | 0.65 |
| Anita | 2 | 0.88 | 0.23 | -1.90 | 1.02 | 0.79 |
| Daniel | 3 | -0.30 | -0.77 | 1.41 | 1.19 | 1.25 |
| Mathew | 4 | -0.86 | 2.03 | 0.40 | 0.57 | -0.64 |
| Tara | 5 | 0.73 | -0.92 | 0.42 | 0.66 | -1.44 |
| Brent | 6 | 0.14 | -0.48 | -0.27 | -0.44 | -1.28 |
| Deb | 7 | -1.32 | -0.17 | -0.48 | -0.39 | 0.21 |
| Nicola | 8 | -0.83 | -0.71 | -0.38 | -1.29 | 0.46 |

The second principal component 'Disciplinary breadth in the Social and Cultural Subdomains' explains 18% of the total factor score variance and comprises three factors. Schools scoring well on this component—Mathew's, Rebecca's, and Anita's schools, in that order—gave a high priority to the Social Justice and Cultural Vision domains of the SWM and had a relatively wide range of learning areas contributing to their Sustainable Wellbeing curriculum. Mathew's, and Rebecca's, school curricula both include religious studies as a core requirement. The explicit inclusion of "Loss, Death and Grief" in religious education for year 12, at Mathew's school, is an element of this component that could be incorporated explicitly in the SWM 'Cultural Evolution and Individual Agency' subdomain descriptor. Tara's and Daniel's schools scored negatively on this component mainly because their small student rolls limit the range of subject specialities they can offer.

The third principal component 'School Leadership for Sustainable Wellbeing' explains 17% of the total factor score variance and comprises three factors. Schools scoring high on this component—i.e. Daniel's, Rebecca's, Mathew's and Tara's—had reserved timetable space for Sustainable Wellbeing learning that all senior students were required to attend. The fact that Daniel's, Rebecca's, and Mathew's schools all ranked in the top four and Rebecca's and Tara's also scored well on PC 1—which prioritises 'student voice'—suggests that nurturing the development of secondary school students' agency/integrating self through an SWM requires a complex mix of teaching skills including confident values leadership, receptivity to the perspectives of young people about their place and times, and respect for their diverse talents and aspirations. Schools that gave a higher priority to individual student subject choice over School Leadership for Sustainable Wellbeing—i.e. Brent's, Deb's, Nicola's, and especially Anita's—scored negatively on this component. Anita's school's philosophy of nurturing

students' interests and passions and permitting new course choices termly undermined the coherence of their SWM Units which were conceived of as whole-year courses.

The fourth principal component 'NCEA for Sustainable Wellbeing with Project Based Learning' explains 16% of the total factor score variance and also comprises three factors. The schools that scored high on this component used NCEA credits to recognise student achievement in education for Sustainable Wellbeing and also gave timetabled space for student projects outside the classroom which could be, but were not necessarily, cross-curricular and Sustainable Wellbeing directed. Daniel's, Anita's, Tara's, and Mathew's schools scored high on this component while Rebecca's and Nicola's scored low, the former because it does not use NCEA in its Te Ara programme, preferring its 'My Mahi' portfolio self-assessment approach, which is recognised in PC1 factor 1.5, and the latter only because Nicola's Sustainability projects were unique at the school and are no longer offered since she left.

The fifth principal component 'Mātauranga Māori and inter-School Collaboration' explains 10% of the total factor score variance and comprises just two factors. The schools scoring well on this component had strong and or made explicit positive connections to Mātauranga Māori in their curriculum and school culture. They were also more likely to be collaborating with other schools and education providers in support of their mutual commitment to Sustainable Wellbeing education; i.e. Daniel's, Anita's, and Rebecca's schools. This was the one component on which Nicola's and Deb's schools both scored positively.

Together these five principal components and eight schools give some tentative shape to the overall form of the proposed emerging SWM Attractor configuration for secondary school education in New Zealand in terms of potential trajectories within and pathways toward it.

## 6.5 SWM Trajectories and Pathways

### 6.5.1 Section Overview

In this chapter, I have presented the findings from three separate lines of investigation into the character, practices, frustrations and aspirations of schools relating to Sustainable Wellbeing education for years 11 to 13 students based on the contributions of twenty-three experienced high school teachers from twenty-two different schools.

The first investigation used publicly available demographic data on all schools in New Zealand to compare the Study schools as a group with the All-Other group of senior secondary school student-inclusive schools and then the Study schools whose teachers provided Sustainable Wellbeing Metacurriculum Unit Outlines with those that did not. The second line of investigation asked participants directly to comment on factors that they felt enabled, constrained or would need to change at the levels of their school, their local community, and nationwide, to implement a Sustainable Wellbeing Metacurriculum for years 11 to 13 students. The third investigation took a case study approach combined with PCA to explore the curriculum, professional structures, and physical environmental factors that have contributed most to the progress of education for Sustainable Wellbeing in the eight PCA schools.

From these three lines of investigation, I identified four distinct types of trajectories individual schools appear to be following in relation to Sustainable Wellbeing education. This typology may apply to the All-Other group of New Zealand schools in general but is not presented as necessarily exhaustive since some types of schools, like single-sex boys-only, and faculties of teachers, like mathematicians, were

underrepresented in my data. Table 6-16 shows the relationship of the four School SWM Trajectories to the groupings of the Study Schools (by participant teacher's name) in each of the three lines of investigation.

*Table 6-16 The four School SWM Trajectories and their relationship to the SWM Unit, Principal Component Analysis (PCA), and Core Participant categories for the twenty-two Study schools.*

| School SWM Trajectory | SWM Unit | Core Participant | PCA | Schools identified by participants' names |
|---|---|---|---|---|
| **Prospective** | No | No | No | Amber, Anthony, Bridget, Brittany, Bronwyn, Gemma, Holly, Lucy, Megan, Philippa, Simon, Stephanie, Tracey |
| **Realpolitikal** | Yes | Yes | Yes | Deb, Nicola |
| **Innovative** | No | Yes | No | Claire |
| | No | Yes | Yes | Brent |
| **Explorative** | Yes | Yes | Yes | Anita, Daniel, Mathew, Rebecca, Tara |

Teachers of the Core Participant schools, following the Realpolitikal, Innovative, and Explorative trajectories, all contributed in some way to Phase 3 of the study, while the Prospective schools teachers contributed only to Phases 1 and/or 2 (See Table 4-1).

I now characterise each of these trajectories in turn in terms of the findings from each of the three lines of investigation and then offer some speculations about possible paths of transition that schools might follow to expedite an SWM Attractor configuration phase change for the New Zealand education system.

### 6.5.2 Prospective schools

The thirteen Prospective schools had a median roll size of 882 in a broad range from about 250 to around 1,600. Although this was the only SWM Trajectory with single-sex boys schools, it included four single-sex girls schools and girls outnumbered boys 57% to 43%. The schools are predominantly European/Pākehā with a median proportion of 65% ranging from 35% to 80%. Two schools had over 50% Māori students. The socioeconomic deciles of the schools covered a very broad range from 2 to 10 with a median of 6. Most (nine) were Mainstream State (yr 9-15) schools. Two were State Integrated and two were Composite (K-13) schools, one state, one Private. The only rural schools in the Study, three, were in this SWM trajectory. Reluctance to support education for sustainability was linked explicitly by one of the rural school teachers to her community's political opposition based on the implications for farmers' livelihoods.

The teachers' views on the factors that are most enabling, constraining or needing to change to foster the uptake of education for Sustainable Wellbeing in their schools are the views of individuals rather than of their institutions. Nevertheless, they throw light on the most important common concerns and how the Prospective school teachers' perspectives contrasted with those of the Core Participant teachers in the Realpolitikal, Innovative, and Explorative trajectory schools.

For the Prospective school teachers, Teacher enthusiasm was the most frequently mentioned factor both as an enabler when present and as a constraint when absent. As already noted, under Enabling factors, Amber wrote “a lot of collaborative, creative teachers” and Holly listed “Other teachers being on board/sharing the load”. Under Constraints, Megan wrote, “Goodwill/fatigue. [Our] College has undergone significant changes in the last six years and a surge in student numbers.” Even Anita, one of the Explorative school teachers, thought possible resistance could arise from “staff reluctance to change”. Inadequate Resourcing in the form of ‘Time, Staffing and Funding’ was the second biggest issue for the Prospective schools’ teachers, followed by a lack of ‘Senior Leadership team support’, and a lack of ‘Community support’.

### 6.5.3 Realpolitikal schools

The two ‘Realpolitikal’ schools had rolls of around 800 and 1,000. The larger school as it happened was a single-sex girls' school and the girls outnumbered boys 79% to 21%. Both schools were under 40% European/Pākehā students and Pacifika students comprised 60% and Māori 21% of the total roll. The socioeconomic deciles of the schools were 3 and 4. Both were mainstream State (Year 7 or 9 to 15) schools.

The ‘Realpolitikal’ schools’ teachers, like the ‘Explorative’, did provide complete SWM Unit exemplars but unlike the latter, these schools’ support for those SWM Units was based on the convenience of having them meet other school priorities, such as engaging disaffected or potentially low-achieving students, rather than on any commitment to School-wide Sustainable Wellbeing Education itself. The Subject-Based Specialist (SBS) collegial isolation of these two SWM-oriented teachers within their schools led to the schools' negative scores on the first four principal components as shown in Table 6-15. Their strength was in PC5 based on its factor 5.1 the strength of Mātauranga Māori, multi-cultural awareness and inclusion in the school. It should be emphasised again that these scores relate to the schools, not to Deb and Nicola as 10 Sustainable Wellbeing (SW) teachers. Nicola’s ‘Self-Watering Planter Boxes’ Unit, for instance, would have scored very positively on PC4 NCEA for Sustainable Wellbeing with Project-Based Learning, if it had been the Units and not the schools that I was evaluating.

Deb and Nicola made quite different comments about the factors they saw as enabling and constraining SW education which possibly reflects the variety of context-dependent situations in which SWM-positive teachers working in generally indifferent collegial and community settings find themselves. Nicola, who had arguably made more progress in her SW curriculum development, focused on proof of concept in terms of the academic success of her students and the importance of funding teacher professional development for the CCH style of teaching required which is unfamiliar to the majority of secondary school teachers. Deb noted that the subject selection available to students would need to change dramatically.

### 6.5.4 Innovative schools

The two ‘Innovative’ schools had the largest rolls of the four SWM Trajectories at just over 2,000 students. Both were Co-Ed, and both were predominantly European/Pākehā at a median of 65%. The second most represented ethnicity was Māori in one and Asian in the other at 10% and 19% respectively. Their socioeconomic deciles were 8 and 9. Both were Mainstream State (yr 9-15) schools.

The ‘Innovative’ schools’ teachers, like those in the ‘Prospective’ schools, did not provide complete SWM Unit exemplars and their schools have much in common with the latter (such as larger total

rolls). Claire's school is included in the Innovative SWM Trajectory rather than the Prospective or Realpolitikal only because she reached phase three of this study by proposing a title and anchoring subdomain for an aspirational SWM Unit. The limited insights she provided about her school in the first two Delphi Survey rounds suggest a school that might have been at a relatively early stage of the Innovative trajectory. Her comments about SWM constraining factors were more typical of the Prospective trajectory, i.e. lack of resourcing, more time required for staff professional development, and potential timetabling clashes. However, she also saw it as enabling "That [the SWM] gives the school a point of difference."

The following characterisation of an 'Innovative' school is based entirely on what I learned from Brent about his school. For Brent, many of the concerns Claire mentioned had already been addressed by his school in the course of implementing their year 9 and 10 Innovation Stream curriculum but both he and Claire mentioned the imperative of meeting their community's expectations regarding the NCEA course and qualification expectations as a possibly insurmountable obstacle. Schools like Brent's are distinguished from the 'Prospective' trajectory by their willingness to consider and experiment with radical alternatives to the traditional subject-based specialist secondary school curriculum in pursuit of future-focused, project-based competency and skills education, including sustainability and wellbeing knowledge, issues, and big ideas like Climate Change as potential contexts but not as the central organising idea of education. Brent's school scored slightly positively on PC1 People, Programmes, Practices, and Place, based on its well-established year 9-10 Innovation Stream, but negatively on the other four PCs, because it had not extended the stream successfully beyond year 11 and Sustainability was not prioritised in the curriculum or a school-wide sense.

### 6.5.5 Explorative schools

The five 'Explorative' schools had the smallest rolls of the four SWM Trajectories ranging from about 90 to around 700 with a median of just 442. The largest of these schools was a single-sex girls school and girls outnumbered boys 67% to 33%. The predominant student ethnicity was European/Pākehā in all but one school. The median proportion was 74% but also the range of proportions was wide from 25% at Daniel's Trades Academy to 83% at Rebecca's school. The socioeconomic deciles of the schools, like the Prospective Trajectory schools, covered a very broad range from 2 to 10 but with a 1-point higher median of 7. All five were Special Character schools. Three were privately run. One was state-integrated and one was a State, composite, designated character school. In contrast to the Prospective, Realpolitikal, and Innovative schools that mainly enrolled Year 9 to 15 students, the Explorative schools were predominantly catering for either Years 1-13 or Years 7 to 15 students. The diversity among these five schools in their demographic characteristics was apparent also in their SWM Attractor principal components, as shown in Table 6-15, and in the factors that these teachers saw as enabling and or constraining the implementation of an SWM.

Tara's school scored positively on: PC1 People, Programmes, Practices, and Place—apart from factor 1.2 the range of Subjects and year levels involved in CCH Sustainable Wellbeing Units; PC4 NCEA for Sustainable Wellbeing with Project-Based Learning; and PC3 School Leadership for Sustainable Wellbeing, in that order. It scored negatively on PC5 Mātauranga Māori and inter-School Collaboration; and Disciplinary Breadth in the Social and Cultural Subdomains. Tara saw the established kaupapa of her school as enabling and already congruent with the values implicit in the SWM. The main constraint she identified was the limited scope of teacher knowledge within their small staff but also the time teachers would need to "integrate this into our already existing curriculum, alongside the need for students to gain NCEA or other qualifications"

Mathew's school scored highest among all the schools on PC2 Disciplinary Breadth in the Social and Cultural Subdomains; and positively also on PC4 NCEA for Sustainable Wellbeing with Project-Based Learning; and PC3 School Leadership for Sustainable Wellbeing. It scored negatively on PC1 People, Programmes, Practices, and Place and also PC5 Mātauranga Māori and inter-school Collaboration. Mathew saw a lack of student, staff and community buy-in as the main constraint. He also suggested that since the school already has responsibility for a native trees reserve that requires plenty of work, "Involving all the students in this work would help share the load" and take the school's sustainability commitment to the "next level - ie community garden".

Daniel's Trades Academy scored positively on PC3 School Leadership for Sustainable Wellbeing; PC4 NCEA for Sustainable Wellbeing with Project-Based Learning; and PC5 Mātauranga Māori and inter-school Collaboration. It had the highest scores of all eight schools for PC3 and PC4 based on its commitment to practical action competence skills and its integration of the academic Education for Sustainability NCEA standards with vocational Unit standards in its 'Urban Farming Outreach' SWM Unit. Because of its small size and limited curriculum breadth, the Academy scored negatively on PC1 People, Programmes, Practices, and Place; and also on PC2 Disciplinary Breadth in the Social and Cultural Subdomains. Daniel felt that an SWM would be enabled through being trusted to "significantly increase wellbeing outcomes" but at the same time could be constrained by appearing "idealistic and unrealistic to prepare young people for the workforce". In his view, the changes needed for schools were a much greater investment in "PD around teachers' capabilities to effectively teach the affective domain well" and an increased "community/whanau" trust in those teachers and schools wanting to lead education in the direction of Sustainable Wellbeing.

Anita's school scored positively on PC1 People, Programmes, Practices, and Place; PC4 NCEA for Sustainable Wellbeing with Project-Based Learning; PC5 Mātauranga Māori and inter-school Collaboration; and PC2 Disciplinary Breadth in the Social and Cultural Subdomains. It had, however, the most negative score in Table 6-15, across all principal components for PC3 School Leadership for Sustainable Wellbeing. Although the school had recently joined the city's 'climate action campus' initiative and Anita's SWM Unit 'Āhurangi-Climate' came closest to being a general SWM course for year 11 among the nine Unit outlines provided to this study, it had not yet resolved the contradiction between its school defining value of prioritising 'student choice' and the need for students to commit for a whole year to complete the course. Students were principally conceived of as consumers of the curriculum products that teachers offered and were expected to market to them in a competitive timetable environment. Anita felt the most enabling factors for the implementation of an SWM in her school would be "Management buy-in and/or students asking for it". The biggest constraint would be that it implied "a big reorganisation of staff and resources" and consequently there would be "staff reluctance to change".

Rebecca's school scored positively on all principal components apart from PC4 NCEA for Sustainable Wellbeing with Project-Based Learning, for which it had the most negative score of the eight PCA schools. The school's approach of restricting NCEA assessment to the SBS mode of their bimodal timetable was in direct contrast to Daniel's and Anita's Units. While the CCH 'Te Ara' programme at the school covered the same learning that would be expected for the NCEA Education for Sustainability Standards, the students were not assessed against these standards, although Rebecca explained "Our Enviroschool kaupapa helps support our programmes, both subject-based and cross-curricular." PC4 includes factor 4.2 the timetabled provision for CCH, student-led project-based learning in the timetable. While the students at Rebecca's school had a very high involvement with student-led project-based learning for SW, these projects were often scheduled as extracurricular activities outside of the formal lesson timetable. "Community service is a big part of the culture of

[this school]", Rebecca told me. "Some [students] complete 100 -200 hours annually!" It was this engagement of the whole school with Sustainability and wellbeing that resulted in its overall first-place ranking among the eight PCA schools. These students were also meeting high academic expectations and the decision to use the 'My mahi' self-assessment portfolios for their CCH 'Te Ara' Units was in part based on not wanting to overburden them with further high-stakes assessment events. Rebecca felt the school had few constraints apart from time on the development of their Sustainable Wellbeing curriculum as it was strongly supported by the school board of trustees, management and student leadership teams. Her priorities for further development were increasing the timetable share for the school's 'Te Ara' CCH programme from two single hours to double periods or even a half day per week and providing "More PD for staff or student senior leaders who could pass on knowledge."

### 6.5.6 Phase shift pathways

The views expressed by participants in this study reflect a relatively brief period between March 2021 and May 2023. This was not a longitudinal study and any suggestions about individual school's directions of travel pathways relative to the four Sustainable Wellbeing Metacurriculum relative trajectories described above can only be speculative. It is noteworthy that the Prospective Trajectory comprises two subsets of schools, the secular Mainstream State secondary schools and the Special Character schools which include faith-based and designated character schools. All five of the Explorative schools in this study were founded on special character values as well as acknowledging the strong SBS tradition of secondary school education, while the Realpolitikal and Innovative schools were all mainstream state schools. From comments made by participants at various stages of the study, it was clear that three of the Explorative schools—Rebecca's, Anita's', and Mathew's—had transitioned over the years from either Prospective or Innovative trajectories toward the SWM attractor configuration, while Daniel's and Tara's more recently established schools have had a strong SWM kaupapa from their beginnings.

The Realpolitikal schools, by contrast, are prepared to let individual teachers pursue CCH courses for Sustainability and Wellbeing so long as that works to maintain or improve student achievement statistics but when those motivated individual teachers move on the school returns to its more familiar Prospective trajectory. The Innovative trajectory as exemplified by Brent's school appears to hold the most promise as a potential pathway for traditional secular state SBS-oriented schools to transition from an SWM Prospective to an SWM Explorative trajectory.

In the next and final chapter of this thesis, I provide answers to my four research questions based on the findings of this study as documented in the previous three chapters and regarding other relevant curriculum initiatives and education for sustainability and wellbeing research. I discuss the limitations of this study and conclude with some recommendations for policy, practitioners and future researchers wanting to address humanity's crisis of Sustainable Wellbeing through curriculum reform in senior secondary school education.

# Chapter 7 Discussion

## 7.1 Discussion Overview

The overarching research question this study set out to answer is:

What would enable secondary schools in Aotearoa New Zealand to establish a Sustainable Wellbeing centred Metacurriculum (SWM) for their years 11 to 13 students?

Three subquestions arose from this main focus. In the following three sections, I discuss my findings in relation to each of these subquestions in turn before returning to consider the overarching question in Section 7.5. I present my overall conclusions in Section 7.6 followed by a discussion of the limitations of this study in Section 7.7, and end with recommendations arising from its findings for future policy, practice and research in Section 7.8.

## 7.2 A co-constructed framework for a Sustainable Wellbeing Metacurriculum (SWM)

### 7.2.1 Section Overview

RQ1—Research sub-question 1 asked:

What would/could a framework for an SWM co-constructed with teachers look like?

Three key responses to this subquestion emerged from the participating teachers' contributions related to this question.

1. The framework would give Sustainable Wellbeing (SW), the status of a core curriculum subject for all students in all year levels and be understood as the metacurriculum's central educational purpose.
2. The framework would be efficiently enabled by a bimodal school timetable with independent but complementary Cross-Curricular Holistic (CCH) and Subject-Based Specialist (SBS) modes. The relative proportions of hours between these modes would be around 2:3 but could vary considerably between schools. This bimodality would enable the CCH nature of Sustainable Wellbeing Education to be provided for all students as a core curriculum subject while also retaining the capacity for student choice of subject-based specialisations in years 11 to 13.
3. The SWM framework co-constructed in this study is a system of three fundamental interwoven domains and nine subdomains at two connected levels centred on central organising attractors. At the Individual-personal-level, the domains are based on our capacities for Action, Feeling, and Thinking. The attractor is the Integrating Self. The corresponding domains at the human-societal level are based on humanity's relationships; with nature, with one another and with itself—the Ecosphere, Social Justice, and Cultural Vision domains respectively. The attractor at this level is the principle of Sustainable Wellbeing.

In the following three sections, I review the key findings supporting each of these responses, comparing and contrasting my findings and conclusions with those of related studies.

### 7.2.2 Core Curriculum Status for Sustainable Wellbeing

From the outset, this research project has been about the necessity and feasibility of raising the status of education for Sustainability and Wellbeing in the secondary school curriculum to being the principal purpose of schooling. My eight case study participants provided insights into how far their schools had progressed toward the idea of centring Sustainable Wellbeing in the curriculum and the constraints they were experiencing to further progress. Only one of these schools had reached the point of making their SW programme a core curriculum requirement for their students at all year levels and of making sustainability and wellbeing initiatives an integral part of the life of their campus and their local school community, (5.3.10, Rebecca et al.—Te Ara-year 12). The other seven schools all evinced various aspects of an SW-centred school, including three that had also made some elements of SW a core curriculum requirement. Rebecca's school's SW education programme—established over seven years and continuing to grow at the time of this study—had the strongest combination of all aspects (see sections 6.4 and 6.5). Taken together, these schools could be seen as following diverse trajectories toward and under the influence of the same SWM attractor.

### 7.2.3 The CCH-SBS Bimodal Timetable

Sustainable Wellbeing, being Cross-Curricular Holistic (CCH) by nature, is problematic for schools to coordinate with traditional timetables that organise teachers' and students' time around 'siloed' Subject-Based Specialist (SBS) faculties. This constraint was mentioned by nine participants and was articulated in the most detail by Brent in connection with the challenges of extending his school's Innovation Stream Curriculum (ISC) beyond year 10 into the senior school, (see Section 5.3.11). The SWM could resolve this difficulty by structuring the school timetable around two separate blocks of time or 'modes' which are synchronous for all staff and students; that is, the CCH and the SBS modes. This arrangement eliminates the problem of scheduling clashes for teachers and students, between the CCH SW classes and the SBS classes. It also facilitates teachers working together in small collaborative teams to plan and lead CCH courses, manage ongoing CCH projects like the school gardens and nursery, and coordinate SBS content allocation and standards-based assessments between the CCH and SBS modes of the timetable. The year 9-10 ISC at Brent's school is possible because it has adopted exactly this bi-modal timetable blocks strategy, for the students in that stream, separating the cross-curricular courses—which are effectively the traditional core subjects of English, Mathematics, Social Studies, and Science recombined—from the non-core and optional subjects like Health and PE, Arts, and Languages. Extending this timetable structure beyond year 10 was difficult for Brent to envisage, not only because of the demand from students for the usual range of specialist career-oriented courses in the senior secondary school but also, because he initially assumed that CCH required all the traditional core subjects to be taught entirely within the CCH mode of the timetable.

From an SWM point of view, the CCH and SBS modes of pedagogy should not be viewed, as being necessarily in irreconcilable conflict. The tension between them arises not because SBS pedagogy is specialised and siloed but because each speciality is self-absorbedly focused on the learning priorities of its discipline and National Certificate of Educational Achievement (NCEA) assessment standards, rather than on aligning that specialized knowledge and skills development with a unifying central purpose such as SW. From the CCH side, the tension is exacerbated if the pedagogy rejects any form of unifying structure, promotes cross-curricularity for its own sake and dissolves into pursuing vague divergent objectives that may or may not result in tangible outcomes, rather than using the

opportunity to call on any relevant disciplinary knowledge to, again, focus on the central purpose of Sustainable Wellbeing. My participant Simon expressed the reservations many high school teachers feel when contemplating a serious commitment to cross-curricular teaching, writing:

> The problem I have is that this is dominated by constructivist logic that does not encourage the acquisition of testable knowledge and encourage[s] students to develop highly specialized skills that will raise the ability of mankind (sic) to address its future problems in a real rather than a philosophical manner.

To be clear, the SWM does not prescribe any particular pedagogical approach. All approaches can be called upon if, and to the extent that teachers find, they further the central purpose of an SWM. The SWM Bi-modal timetable would inevitably mean, however, that students would not get as many teacher contact hours in their preferred speciality learning areas as they would if there were no CCH SW component. This 'sacrifice', I argue, would be more than offset by improved student engagement across all contact hours as a result of the SWM's greater intrinsic relevance to our young peoples' unavoidable, actual future and through the more egalitarian socialisation and academic opportunities provided by unstreamed (i.e. 'untracked' in the US) student peer groupings (Hunter et al., 2020; Pomeroy et al., 2020; Rui, 2009) in its CCH mode. The aim here is to achieve the enabling constraint relationship between engaging relevant progressive pedagogy and cognitively demanding academic knowledge that Rata et al. (2019, p. 167) see as "the challenge for the social realist project" and "a major pedagogical challenge identified by many writers" (p. 167). Proof of concept is, by the nature of our Business as Unsustainable (BaU)-dominated reality, difficult to provide but the fact that Rebecca's school was not only the most SW-centred but also the most academically successful among the eight case study schools (see Table 6-13) demonstrates, at least, that these objectives are not mutually exclusive.

My teacher participants readily adopted the CCH and SBS terminology as recognisably distinct modes of pedagogy, but their interpretations of what CCH teaching would or should look like varied widely, a finding consistent with Mård and Klausen's (2023b) observation that "crosscurricular teaching is an approach traditionally characterized by terminological unclarity". For some participants, CCH meant integrating SWM knowledge, issues and big ideas into their familiar SBS lessons as important pedagogical contexts. For others, it meant creating courses, activities, and projects for students based on the SWM domains that called on content from any learning area as required and were collaboratively planned and taught by colleagues working in transdisciplinary teams. The average proportion of teacher-student contact time my participants suggested should be assigned to the CCH mode was 39%. The distribution of proportions was, however, distinctly bimodal with a relatively high standard deviation of ±30% (see Table 4-3).

## 7.2.4 The Co-constructed SWM framework

### *7.2.4.1 The co-construction Process*

The SWM framework—co-constructed with teachers in this study—is built on a complex adaptive systems view of the world using the Triadic Sierpinski Fractal (TSF) form, introduced in Section 2.6.3. The SWM framework was introduced to the study participants as a minimal framework of two levels—the Human-Societal and Individual-Personal—and three domains at each level—Ecosphere, Global Justice, and Cultural Vision at the former corresponding with Action, Feeling, and Thinking at the latter. Through this study, each domain was further differentiated into three subdomains that have a

self-similar fractal relationship to the three domains, and the subdomains were similalrly elaborated with three or four exemplar Sustainable Wellbeing Goals in each.

Table 7-1 shows the most recent version of the domains, subdomains and associated descriptors of the Human-Societal level of the framework that emerged from teachers' suggestions and feedback interpreted through the empty TSF form, including the replacement of 'Maker-Recyclers' with 'Cyclic Maker-Consumers' as explained in Section 4.5.4.2.

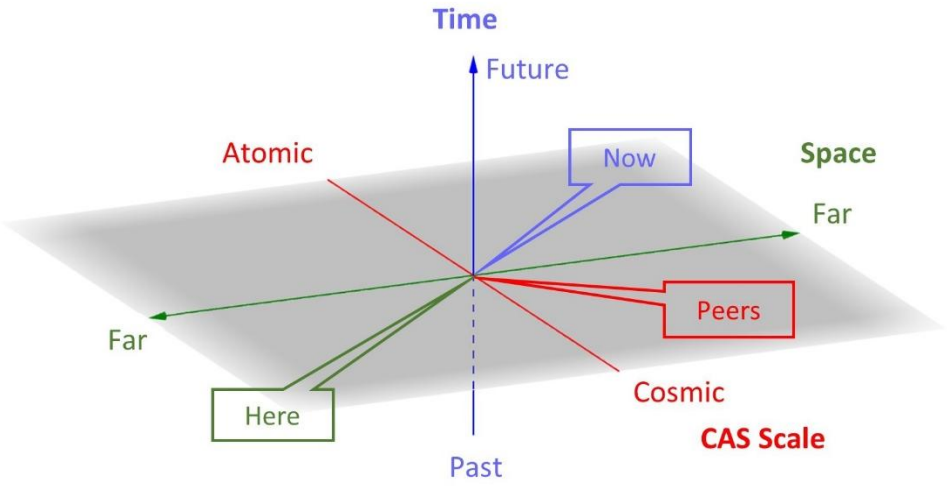
*Table 7-1 The second iteration of the SWM framework's three domains and nine subdomains at the Human-Societal level, showing provisional Titles and Descriptors for each subdomain*

| Domain / Subdomain | | | Domain & Subdomain Descriptors |
|---|---|---|---|
| **Ecosphere** | | | **Humanity's relationship with its planetary, ecological, and built environment** |
| | EE | Cyclic Maker-Consumers | are responsible for evolving human-built and physically modified environments [in ways that harmonise with and sustain the earth]. |
| | ES | Regenerative-Cultivators | manage human-occupied land and water ecosystems for human sustenance in ways that improve their wellbeing [and ours]. |
| | EC | Kaitiaki Guardians | look out toward, explore, and seek alignment with more than human nature. Kaitiaki Guardians are conscious of being part of nature and of our duty of care toward and need of respect for it. |
| **Social Justice** | | | **Humanity's world of social, political, and community relationships.** |
| | SE | Whanau and Community | is concerned with respectful, face-to-face relationships of mutual physical, emotional, mental, and intergenerational support. |
| | SS | Equity, Rights and Responsibilities | is concerned with equity, balance, [rhythm and reciprocity]. The awareness and collective strength, of mutual wellbeing within and between individuals, communities and nations. |
| | SC | Power and Influence | deals with humanity's struggle to avoid catastrophic conflict and govern itself for the collective determination of an ecologically sustainable world order extending to mutually beneficial relationships with all other species. |
| **Cultural Vision** | | | **Humanity's relationship with its cultural histories, its present, and its future** |
| | CE | Our cultural inheritance | seeks to learn crucial lessons from the triumphs and tragedies of our own culture's past, for the sustainable wellbeing of future generations. |
| | CS | Others' cultures and World views | cultivates an appreciation for the diversity of world views in our time. It investigates how cultures can be more or less well adapted to their social and natural environments, and whether any worldview can ever be final. |
| | CC | Cultural evolution and Individual agency | is about the power of the individual to influence history and societies' need to nurture individual [creativity]. It is about new visions of, and paths toward, a Sustainable Wellbeing future for the planet and humanity. |

The self-similar fractal relationships among the subdomains are based on an overarching dimensional interpretation of the Ecosphere, Global Justice, and Cultural Vision domains which was confirmed by this data analysis process but is not immediately apparent in the Subdomain titles and descriptors. Figure 7-1 is an illustration of the larger system of conceptual dimensions in which all complex adaptive systems can be thought of as being embedded. At the centre is a bounded Complex Adaptive

System (CAS), e.g. an individual human self, immersed within its/their spatial, social and temporal environment; Here, amongst Peers (e.g. other human beings), and Now. Physical space, CAS Scale, and Time are the dimensional bases of the Ecosphere, Social Justice, and Cultural Vision domains respectively. The three familiar spatial orientations (left-right, front-back, up-down) are represented by just one dimension in this graphic. The two directions labelled 'Far' should be interpreted as meaning distant in any spatially opposing directions. These dimensions are the basis of the fractal interweaving of the domains represented by the nine subdomains.

*Figure 7-1 The dimensional character (Space, CAS scale, Time) of the Sustainable Wellbeing Metacurriculum (SWM) domains (Ecosphere, Social Justice, Cultural Vision respectively).*




Each subdomain in Table 7-1 has a two-letter code. The first letter is the principal domain, the second is the secondary domain. The principal and secondary domains have distinct functions in the subdomain code. The principal domain refers to a specific range of its dimensional spectrum. For the Ecosphere these ranges are spatially geographically based; Local, Regional, and Global; for the Social Justice Domain, they are based on the scale of social networks: Whanau and Community (i.e. Family and direct in-person relationships), Citizenship, and Trans and Inter-nationality; and for the Cultural vision domain, they are defined temporally; Past (ancestral history), Present (contemporary worldviews) and Future (Visions for descendants).

The secondary domain refers to the whole range of its corresponding dimension. The title and descriptor for each subdomain attempt to capture the essence of the Sustainable Wellbeing challenge presented by the relationships between the subdomain's principal domain and the whole spectrum of its secondary domain. So, for example, EE, Cyclic Maker-Consumers, is about the SW relationship between one's home ground (school campus) and the rest of the Ecosphere, i.e. zero unrecyclable waste to any other part of the campus, local landfill, waterways or atmosphere. ES, Regenerative-Cultivators is about the SW relationship between Regionally adjacent land, waterways and atmosphere, and Social networks at all scales from Whanau and Community, Citizenship, and Trans and Inter-national entities, i.e. local & regional land use politics. EC, Kaitiaki Guardians is about the SW relationship between the global Ecosphere and the long-run evolution of our species, Past, Present,

and Future, i.e. the challenge of understanding how we got to our current perilous eco-crisis and how we might collectively achieve a long term future for humankind. This subdomain would deal with, among other things, the environmental phenomena of climate change and biodiversity and how anthropogenic activity is very rapidly disrupting planetary processes established over geological time scales. The corresponding principal-secondary domain relationships for all three domains and nine subdomains are summarised in Appendix E, Table E-1

The minimal SWM framework presented to teachers—and readily adopted by those who participated in phase 3 of the study—included the concept of an Anchoring domain or subdomain and any number of Connecting domains and subdomains. The Anchoring-Connecting concept—introduced in Section 3.5.4 as another enabling constraint for SWM Unit planning—enables teachers to select whatever combination and sequence of subdomains suits their context and Unit objectives while the hierarchical fractal structure of the framework subdomains encourages them to keep all domains of the SWM in mind at each stage of planning and teaching. The flexibility of the SWM framework for Unit planning is illustrated in Table 5-8 for the nine case study Units described in Section 5.4. This table shows the diversity of subdomain combinations involved across these nine Units. It also shows that while teachers chose Connecting Sustainable Wellbeing Goals from all nine Subdomains, most chose one of the three Ecosphere subdomains as their Unit's Anchoring subdomain. This had implications for my second research subquestion which I discuss in Section 7.3.

At the Individual-Personal level of the framework, the analysis of participants' suggestions of desirable Skills, Competencies, and Dispositions for SW, showed that this level required two orientations—inter and intra-personal, outward and inward respectively, each with its subdomains. Also, the system attractor at this level, the Integrating-Self, had to be treated as a fourth Domain since many competencies suggested, such as Self-Awareness, and Adaptability, have components in all three domains of Action, Feeling, and Thinking which vary idiosyncraticly from one person to the next.

During the study, It became clear that the research design adopted by this PhD study was not ideal for exploring the Individual-Personal level of the framework and the co-construction of the framework would have to be limited to the Human-Societal level primarily. A start was at least made on testing this level of framework by three of my participants as detailed in Section 5.4.2.2 and Table 5-11. Eames, Barker, et al. (2010) report a similar limiting experience of complexity in exploring the individual action-competence level of their whole-school framework for Education for Sustainability (EfS).

Whereas the Human-Societal level addresses the one complex system we all live within, the complex systems addressed by the Interpersonal-Intrapersonal level are as numerous as students themselves. This is more properly the realm of fine-grained case-study action research involving teachers scaffolding individual and small groups of students in developing self-awareness, self-control, and self-actualisation in their own unique complex inner and social, action, feeling, and thinking domain dynamics. The positive evaluation of this level of the SWM framework given by teachers in the first Delphi round is an encouragement for its possible use as a theoretical starting point for future research.

#### *7.2.4.2 The co-construction Framework evaluation.*

In each round of the Delphi study, the participating teachers were asked to evaluate the emerging framework in terms of its 'usefulness for thinking about Sustainable Wellbeing Education'. The mean ratings were positive through all rounds with an acceptable level of consensus. In round 1 the given minimal framework was rated 'Good' at the Human-Societal level and 'Very Good' at the Individual-Interpersonal level by 21 and 18 of the 22 teachers who participated respectively. In round 2 the framework of 9 Human-Societal level subdomains emerging from round 1, had an improved evaluation of 'Very Good' on average by the 13 teachers who completed both rounds. Phase 3 of the overall study, included evaluations of the 'overall usefulness of the SWM framework for thinking about Sustainable Wellbeing Education'. While the average evaluations for both were still in the 'Very Good' and the 'Good' range, they were slightly under the Human-Societal level evaluation in round 2.

#### *7.2.4.3 Other Models for Sustainability and Wellbeing Curricula*

In the first round of the present study, when participants were asked 'What would need to CHANGE in your school to facilitate the implementation of a Sustainable Wellbeing Metacurriculum?' the most frequent theme of the responses was, 'A Convincing argument and plan' (see Section 6.3.2). Curriculum models for sustainability and twenty-first-century competencies have not been well-supported by an "explicit and effective systems theory that supports an adequate implementation strategy" (Reimers & Chung, 2016, p. 239). In their study of whole-school approaches to Education for Sustainability (EfS), Eames, Barker, et al. (2010) found "a rich array of possible expectations and outcomes for whole-school approaches" (p. 1) in their literature review but "identified few robust tools for exploring the holistic nature of student learning in EfS." (p. 1) The SWM framework is an attempt to set out a convincing complex systems-based plan and implementation strategy for the exploration of education for Sustainable Wellbeing in Aotearoa New Zealand high schools.

Curriculum models that employ sets of domains for sustainability or twenty-first-century competencies similar to those of the SWM framework can be found, for example, Kaukko et al (2021), (Fadel & Groff, 2019), and (Musson, 2024) but they do not appear to link these domains systematically and coherently with the traditional learning areas of the secondary school curriculum. Musson's (2024) Triple WellBeing® framework, in particular, like the SWM adopts a systems view of the world and has essentially the same primary dimensions with a fractal-like form. It does not, however, adopt an explicit Complex Adaptive Systems (CAS) understanding with distinct Human-Societal and Individual-Interpersonal levels. It is these features of the SWM framework that give it the potential to link and coordinate its CCH mode domains with the traditional disciplines of the secondary school curriculum underpinning its SBS mode. This harmonising potential is the focus of my second research subquestion.

## 7.3 Linking the SWM to the New Zealand Curriculum and the National Certificate of Educational Achievement

### 7.3.1 Section Overview

RQ2—Research sub-question 2 asked:

> What links would/could teachers establish between the SWM framework, the New Zealand Curriculum learning areas, and National Certificate of Educational Achievement (NCEA) standards or other appropriate school leaver qualifications?

Whereas the bases for answering RQ1 had to be established in phase 1 of the study at the start of the first Delphi round, RQ2 could not be addressed until the third Delphi round, once the SWM framework subdomains and Sustainable Wellbeing Goals (SWGs) had been co-constructed. While the approach taken to answering RQ1 was based on theory and teachers' professional judgements, RQ2 was about the teachers' actual practice. It explores how teachers—for whom Sustainable Wellbeing education is a priority—are currently designing and implementing their curriculum guided by the affordances and constraints of the New Zealand Curriculum (NZC) (NZ Ministry of Education, 2007) and accreditation possibilities offered by the NCEA (New Zealand Qualification Authority, 2024b), using the SWM framework they co-constructed.

Although eight teacher participants outlined nine Units using the SWM framework, the data available to answer RQ2 specifically, linking the subdomains to the NZC learning areas and NCEA standards, was limited to just six of these Units. My answer to research subquestion 2 is given in three parts. The first part concerns the predominance given by my participants in their teaching practice to the SWM framework subdomains of the Ecosphere over those of the Social Justice, and Cultural Vision domains. Second, I discuss the clear associations that were apparent between the Ecosphere domain and the learning areas of the NZC and NCEA. Third, I discuss the assessment and accreditation challenges that constrain schools wanting to transition from the traditional BaU SBS paradigm of secondary schooling to an SWM.

### 7.3.2 Priority of the Ecosphere

The SWM framework co-construction process produced nine subdomains evenly distributed over three domains. There were strong indications from my data that the Ecosphere domain and its self-similar subdomains were of the highest priority for my participating teachers in practice, followed by the Social Justice domain which in turn was more important than the Cultural Vision domain. This finding limited the range of possible associations that my analysis could identify between the SWM subdomains and established learning areas and subjects.

The Ecosphere orientation of the nine SWM Units provided by participants in this study was most apparent in their Anchoring Subdomains as shown in Table 5-2 in Section 5.2. By contrast, these Units' Connected subdomains and Sustainable Wellbeing Goals (SWG) were evenly distributed across all three domains. The details of the Anchoring and Connected Subdomains, and SWGs, for all nine SWM Units are presented in Table 5-8, Section 5.4.2.1. The most frequently referenced connected subdomains were, in descending order, 'Whanau and Community', 'Maker-Recyclers' and 'Our Cultural Inheritance'. Interestingly, and perhaps not coincidentally, the Ecosphere is the secondary fractal domain of all three. 'Whanau and Community' was one of the four subdomains not selected as an Anchoring subdomain, but it was the only subdomain selected as Connecting, for all nine Units. This finding reflects the dimensional definition of this subdomain. Being the Social Justice Subdomain of family and personal relationships, it is closest to interfacing with the Individual-Interpersonal level of the SWM framework. It includes the Sustainable Wellbeing Goal SE3 which references Te Whare Tapa Wha (Durie, 2009), the model of Wellbeing familiar to New Zealand teachers as, an established

element of the New Zealand Curriculum (NZ Ministry of Education, 2007) Health and Physical Education learning area.

This order of domain prioritisation—Ecosphere, Social Justice, Cultural Vision—is a reflection of the self-selected nature of this study's research participant panel, their passion for sustainability and wellbeing education and their disciplinary specialities. This domain prioritisation pattern had already appeared in their responses to a question in the second Delphi survey round. When asked which cross-curricular subdomain teaching teams they would prefer to join, for the collaborative development of an SWM Unit given the opportunity, the Ecosphere subdomains were the first choice for 9 of these 14 teachers as shown in Figure 5-1, in Section 5.2. The prioritisation by teachers in this study of the Ecosphere domain over Social Justice and Social Justice over the Cultural Vision domain supports the view that the most effective way to move students toward action for, valuing, and conceiving of Sustainable Wellbeing may not lie simply through academic study at screens and in classrooms (Backman et al., 2024; Hill, 2012; Snow & Obed, 2022). Outdoor physical activities, directly related to positive experiences of nature connection and through participation in ongoing, collective sustainability projects supported by the school community, may have a far greater, enduring, and ultimately academically inspiring impact. Informing students of the nature, gravity, and causes of environmental problems may raise their awareness but also stress levels and feelings of powerlessness without having any positive effect on behaviour change (Clayton & Karazsia, 2020), their "motivation to obtain further knowledge, or to become involved in collective civic actions" (Muñoz-García et al., 2022, p. 1), or their action competence (Jensen & Schnack, 1997).

The emphasis given by the participants in this study to the SWM framework's Ecosphere subdomains can also be interpreted, I argue, as a recognition that, in working with adolescents, raising awareness of what we stand to lose through environmental degradation will not facilitate the development of action competence if empathy for nature is not cultivated at the same time. The Ecosphere subdomains, especially Kaitiaki-Guardians, require time spent in nature. With increasing exposure, time in nature has been observed to improve, pro-environmental attitudes and behaviours in adolescents as have positive experiences in nature during childhood generally (Muñoz-García et al., 2022). The psychological construct of nature-connectedness—defined simply as "the closeness of an individual's relationship with nature" (Richardson et al., 2022, p. 1)—has been measured and shown to be positively correlated with pro-environmental behaviours and mental well-being.

Although the Social Justice subdomains did not feature strongly amongst the anchoring subdomains of teachers Units in this study, they were, as already noted, most important among the Connecting subdomains. Participation in purposeful physical activities with others in nature can lead to improved socio-emotional wellbeing for both students and staff. Spending time in a natural environment has been shown to promote not only pro-environmental behaviours but also collective as well as individual wellbeing. (Wilkie et al., 2022, p. 3).

The SWM Cultural Vision domain, which aligns with thinking and mental wellbeing at the individual-interpersonal level of the framework, did not feature among the anchoring subdomains of the participants' Units in this study but was referenced by 7 of the 9 Units through their Connecting subdomains. Two Units were anchored in the Ecosphere, Kaitiaki-Guardians subdomain for which Cultural Vision, is the secondary fractal domain. Both these Units were related to taking a long-term view of the impacts of environmental degradation and climate change. Action competence developed through Units within this subdomain could also include biodiversity and restoration projects in forest, wetland, and marine environments as well as simply being there with no specific agenda other than to experience mindfulness and belonging in nature. The capacity to 'Not Do' when appropriate, to simply 'be present', could in this sense also be seen as an 'action competence'. Vidal-Meliá et al. (2022)

report finding that mindfulness fosters resilience, which is often spoken about as an individual and community character trait that confronting the sustainable wellbeing crisis demands and which land-based nature-connected education can develop as an agentic counter to eco-anxiety (Glass et al., 2022; Snow & Obed, 2022).

In this study "resilience" was specifically mentioned by seven different teachers as a desirable character trait for students to develop. They connected resilience variously to physical, emotional and mental wellbeing, dexterity and cognitive skills at the individual level as well as action, nature connection, nature therapy in the Ecosphere domain and empathy and gratitude in the Social Justice domain at the human-societal level of the framework. Resilience, in the sense these teachers understand it, is not associated with a stoic acceptance of the inevitability of environmental destruction "breeding acceptance in place of outraged inspiration" (Verlie, 2021, p. 8) but rather with the capacity to not be overwhelmed by eco-anxiety. Vidal-Meliá et al. (2022) found that resilience, developed through the cultivation of mindfulness also led to improved academic performance. This connection brings me back to my second research subquestion and the links that I set out to establish between the SWM framework subdomains and the learning areas and subjects of the NZC and NCEA standards which guide and accredit the educational achievement of New Zealand students in years 11 to 13 school.

### 7.3.3 The SWM and the NZC-NCEA Learning Areas

Educational achievement—that is, vocational and academic achievement—is assessed against NZC achievement objectives and NCEA standards in New Zealand. The curriculum and accreditation systems become inextricably entwined at this level of schooling. A Metacurriculum that affords Sustainable Wellbeing core curriculum status, can only gain traction and credibility to the extent that it can be related to and influence existing national curriculum objectives and accreditation standards. The word 'influence' is crucial in this sentence, since the SWM is predicated on a fundamental re-orientation of educational values including purposeful cross-curricular integration that the present NCEA system is not only not set up to assess, but actively discourages (Hipkins et al., 2016, p. 119).

The links between the SWM subdomains and the NZC achievement objectives or NCEA standards that can be established through this study are necessarily limited by the six Units for which achievement objectives or standards were defined and to the four of nine available subdomains in which these linked Units were anchored. Nevertheless, indicators of definite and potential associations consistent with earlier studies (Hipkins, 2007), were apparent between SWM Subdomains and the established curriculum learning areas. The six linked Units were all anchored in one of the three Ecosphere Subdomains or the Social Justice; Equity, Rights, and Responsibilities subdomain and they were explicitly linked to the NZC and NCEA learning areas of Technology, Science, Social Science, and Health and Physical Education. These associations are summarised in Table 5-12 (NZC Achievement Objectives) and Table 5-13 (NCEA Standards).

Conspicuous among the SWM subdomains by their absence from the six linked units are the two Social Justice subdomains—Whanau and Community, and Power and Influence—and the three Cultural Vision subdomains—Our Cultural Inheritance, Others' cultures and World views, and Cultural Evolution and Individual agency. Among the LAs, Mathematics, English, the Arts, and Languages are underrepresented in these Units and are absent from the NCEA standards chosen to assess them.

Although it can only be speculation in the absence of a much broader sample of SWM Units, I suggest that the Arts, and Languages, would have their main contributions to make in the Cultural Vision subdomains along with Social Sciences. The Social Justice subdomains—Whanau and Community, and Power and Influence would be likely to draw on the Social Sciences, English and Languages, particularly Te Reo in New Zealand. The Mathematics and English LAs could potentially contribute significantly to all nine SWM subdomains.

Secondary school teachers, particularly mathematics teachers, possess immense authority within their subject areas (Amit & Fried, 2005). This authority can be strongly circumscribed, however, by the expectations of both students and parents. Teachers in both my Masters degree research (Morey, 2008) and the present study stressed the value of mutually supportive team teaching and collaboration for the redefinition and broadening of their professional authority when introducing curriculum integration and cross-curricular teaching. The separation of CCH and SBS modes in the SWM timetable facilitates teachers in all learning areas to become involved in CCH Units. Only one of the six linked SWM Units specifically mentioned NZC achievement objectives from the English LA and none were linked to English NCEA standards. Nevertheless, there is reason to believe that English teachers would be more amenable to joining SWM cross-curricular teaching teams than mathematics teachers. Four teachers with English teaching expertise participated in this study. The second Delphi round included the question, “In your years 11-13 Subject-Based courses, which SWM subdomains would benefit from or contribute to your Subjects' big ideas and significant learning outcomes/foci?”. Two of the four English teachers listed all nine SWM subdomains and two omitted only the three Ecosphere subdomains. The most likely explanation for the relative absence of the English LA from the six linked Units in my study and indeed the continuing low incidence of CCH Units/courses at the senior high school level, in general, is the structural constraints placed on cross-curricular course designs by the current BaU secondary school timetables and accreditation system, that aim to maximise student subject choice; as Brent explained with his example of attempting to form a cross-curricular English integrated with a health class that then clashed with a dance class that only some of these students were opting for (see Appendix C-3.11).

Both the NZC Achievement Objectives and the NCEA standards selected by teachers for their SWM Units are predominantly written at a level intended for sixteen-year-old students even though the Units are designed for sixteen to eighteen-year-olds, as observed in Appendices C-5 and C-6 (see also Table 5-2). This could be a deliberate pedagogical strategy of CCH teaching where students may be asked to consider content from a wide range of disciplines they have not previously studied to their current age-related curriculum level. It might also be that the higher-level Achievement Objectives and Standards in subject areas such as Languages, The Arts, English, and Mathematics, are potentially well linked to the exploration of Sustainable Wellbeing big ideas, knowledge, and issues, but that SBS teachers in these learning areas habitually interpret and apply them in Business as Unsustainable contexts. Furthermore, and critically, as Brent pointed out (see Section C-3.11), teachers do not look for—or cannot take advantage of, for timetable-logistical reasons—the multiple potential cross-curricular synergies that exist to enable students to achieve objectives and meet standards in two or more subjects simultaneously with single sufficiently well-designed, shared assessment tasks or projects.

### 7.3.4 The Politics of CCH-SBS Complementarity

The six linked Units provided by the participants in this study demonstrate that teachers can and are creating cross-curricular courses that can be described in terms of the Sustainable Wellbeing Metacurriculum subdomains connected coherently and epistemologically with the NZC learning area

concepts and NCEA standards. The links that can be established seem to be limited not so much by epistemological necessity but rather by rigid political ideologies, institutional structures, and perhaps fear of the unknown.

The solution to the timetabling coordination tension between CCH courses and SBS courses proposed by the Sustainable Wellbeing Metacurriculum is to introduce a complementary bimodal timetable, as described in Section 7.2.3. The main obstacle to the acceptance of this timetabling solution is likely to be the ongoing ideological debate between the integrated and collection-type approaches to curriculum, which has manifested over the last two decades in the tension between the twenty-first century—future-focused (21CFF) (Bolstad et al., 2012; Leicht et al., 2018; Reimers & Chung, 2016) and the Social Realist—Powerful Knowledge (SRPK) (Johnston, 2022; McPhail & Rata, 2016; Young & Muller, 2010) schools of curriculum theory, as discussed in Section 2.5.3. The NZC (2007) set out to be inclusive of both perspectives but did not adequately demonstrate how the distance between its 21CFF values, principles, and key competencies front half and its LA Statements-SRPK achievement objectives back half, could be operationally bridged by schools and teachers (Hipkins et al., 2016). Coherence was one of the eight principles of the NZC (2007), yet it did not itself achieve this overall coherence.

At the time I was gathering the data for this study in 2021-22, the then Labour-led government had put in place review processes for both the NZC (2007) and the NCEA qualification—the Curriculum refresh (*Te Mātaiaho*) and the NCEA Review of Achievement standards (*RAS*), respectively. Both reviews are ongoing in December 2024 as I write. As detailed in Section 5.4.3.4, my research participants expressed a range of views, from positive to concerned, about the likely implications for an SWM of the Curriculum refresh and RAS processes. Their comments were cautious in light of the 'work in progress' status of the review processes.

Since 2022 and consistent with the accelerating pace of global social change, the curriculum and assessment debate in New Zealand education has continued to morph from being about integrated type-21CFF versus collection type-SRPK curricula—which frames the purpose of education debate as a choice between apparently incompatible worldviews (Bernstein, 1975; Young & Muller, 2010)—to include a distinct racial and cultural axis: New Zealand's Indigenous mātauranga Māori against the established Science of Learning.

Major challenges for any senior secondary school curriculum designed to reach and be relevant to all students are;

- the need to "ensure continuity of pathways" (Hipkins & Vaughan, 2019, p. 8) for students into employment, and tertiary education—technical and academic—and
- the long-standing entrenched divides that appear as early as year 9 for students being streamed along these divergent pathways based on their "perceived abilities" (p. 20).

The NCEA qualification entry requirements of tertiary educational institutions—polytechnics, technical institutes and universities in New Zealand—reinforce these pathways by having a profound influence on schools' course offerings and student subject choices in the final three years of secondary school education (Hipkins et al., 2016).

Nine participants in this study commented on the challenges that the SWM CCH mode could present for their school's existing assessment and qualification practices, especially concerning University

Entrance requirements. Teachers' general comments about assessment constraints in years 11 to 13 included the priority of credit accumulation over learning, the domination of obligatory subject-based assessment schedules over timetables and opportunities that could facilitate the exploration of sustainable wellbeing and cross-curricular collaborative projects using standards to assess skills such as critical thinking, learner agency and self-integration. These findings confirm that little appears to have changed in the relationship between curriculum and accreditation in these regards in New Zealand over the last ten to twenty years.

The NCEA qualification uses two types of standards defined as Unit and Achievement standards. Unit standards are most often associated with trades skills and vocational pathways while achievement standards are "designed to certify broad conceptual and communicative achievement in the cognitive disciplines" (Hipkins et al., 2016, p. 77). All six of the linked Units in this study used two or more Achievement standards for assessment and three also included one or more Unit standards (see Appendix C-6). Only Daniel's 'Urban Farming Outreach' Unit offered the majority of its credits as Unit standards but also included Education for Sustainability achievement standards at level 2 or 3 of the certificate. Three of the nine Core teachers in the study commented on the curriculum constraints imposed by the Universities 'Approved Subjects' list and requirements for university entrance (New Zealand Qualification Authority, 2024a). One teacher, Deb, noted that the Achievement standards for the Technology learning area are not generally regarded as high-status even though—like the Education for Sustainability standards in the Social Science Learning Area— they are on the University's approved subjects list, and that this would be a challenge for the SWM. Her suggestion is confirmed by the predominance of the Technology learning area NZC objectives and NCEA standards linked to the Ecosphere domain in the SWM Units provided for this study.

As Brent asked in the first Delphi Survey round which was completed in April 2021;

> How can we integrate these concepts but still keep UE [University Entrance] results high as this is what our community want?
> At year 13 there is more pressure to cover subject-specific content and NCEA standards that are required by the universities for entrance to specific courses. In reality, any senior curriculum is driven by assessment practices.

As observed by Hipkins et al. (2016), these issues with University Entrance regulation are not new for ambitious cross-curricular course design but should not be insurmountable;

> with careful course planning and. more innovative timetabling, it ought to be possible for a student to undertake at least some courses with cross-disciplinary assessment programmes, without seriously compromising their UE prospects.
>
> (p. 173)

A further challenge imposed by NCEA assessment, mentioned by Hipkins et al. (2016) and both Brent and Deb in their interviews in 2021, that persists for cross-curricular courses in a Subject-Based Specialist (SBS) timetable is the 'double-dipping regulation' which prevents teachers from offering students a standard that they may already be undertaking learning towards in a different class, especially in high-status academic subjects. Again, it is difficulties in coordinating teachers' cross-curricular collaboration like this that the CCH timetable mode of the SWM proposal is designed to resolve.

There are encouraging signs that since about 2020, the status of transdisciplinary Sustainability, Climate Change and Citizenship study is rapidly changing in University degree courses if not yet so much in technology institutes and polytechnics. As Nicola commented in her 2021 interview "three

years ago, when I was looking to do my master's, and I wanted it to be based on sustainability. I could not find a master's program that did that. And now, all of the universities do it."

These developments in university programmes improve the likelihood of secondary schools considering the adoption of a Sustainable Wellbeing Metacurriculum. However, in 2022, only 31% of school leavers in New Zealand went on to bachelor-level study or above. Around 24% went on to other tertiary education and 44% were not in any tertiary education (NZ Ministry of Education, 2024c). The career path constraint on introducing an SWM at high school then for 68% of students is influenced by the priorities of businesses employing school leavers and of Tertiary Technical educators. While Universities may be beginning to recognise the sustainability crisis, New Zealand technical institutes and polytechnics still seem oblivious. In a recent report titled *The Evolution of NZ Institutes of Technology and Polytechnics* (Doyle et al., 2022), the words 'sustainable' and 'environment' appear only in routine generic contexts, for instance, when describing the planned new tertiary education system as "an innovative, sustainable network of public provision" (p. 52). Few big corporations globally including in New Zealand "mention or explicitly agree with the scientific consensus on climate change" (Thaker, 2019, p. 1) in their reporting.

Currently, it is up to individual schools and communities to conclude whether the level of Sustainability, Wellbeing and Climate action consciousness and competence their students leave school with is sufficient to equip them for global citizenship and the immanent environmental shocks that climate science is predicting. They must then decide whether or not that conclusion imposes on them a professional and moral imperative for transformative systemic change in all aspects of school life, not least in the curriculum. A potential lifeline for teachers in this regard, found in this study, is the role that Trades Academies and Units such as Daniel's "Urban farming outreach" could play at the, literally, grass and flax roots level in this country. Trades academies are funded by the Ministry of Education and provide access for senior secondary students, who might otherwise disengage from formal schooling to a broad range of trades or technology courses that typically include sustainability and wellbeing Units. Daniel's "Urban Farming Outreach" Unit is of particular relevance to the cross-curricular qualifications challenge of the SWM. It demonstrates the innovative potential of the NCEA's flexibility by combining trades-oriented unit standards with academic, holistic, and reflective education for sustainability achievement standards in one coherent package. It demonstrates how the metacurriculum's focus on sustainable wellbeing might allow students to break out of being either "trapped in the vocational" or "trapped in the academic" (Hipkins et al., 2016, p. 192), separated on either side of the wall that currently divides them.

The holistic systems thinking built into the SWM calls for a style of assessment and accreditation that must go beyond considering NCEA standards in isolation and enable students to demonstrate and be accredited for their ability to draw together the complex threads of Sustainable Wellbeing projects across all nine subdomains. Two Units that appeared to allow students to realize that level of synthesis did so in very different ways. Daniel's 'Urban Farming Outreach' used a combination of an NCEA Education for Sustainability Achievement standard with horticulture and apiculture Unit standards allowing them to earn credits toward either a level 2 or a level 3 certificate. At level 3 for instance, the achievement standard *90828: Evaluate a personal action that contributes towards a sustainable future* allows students to review their whole course experience and to include in their summation examples drawn from all five of the unit standards. Rebecca's 'Te Ara–Year 12' course eschewed the use of NCEA standards altogether on wellbeing grounds arguing that students already had access to all the credits they needed to achieve NCEA and UE in their other SBS lessons. The students were instead required to build up out of their own curated work a coherent record of their learning in a portfolio named *My*

*Mahi*[13]. The scope of what students can include in their *My Mahi* goes well beyond their coursework for 'Te Ara–Year 12' to cover all their activities and achievements at school. Its assessment purpose is formative rather than summative and self-improvement-oriented. It serves as both a cumulative record of learning and as a resource. There did not appear to be any requirement for a deliberate synthesis of academic learning although self-integration through planning and reflection is integral to the *My Mahi* portfolio concept.

These contrasting approaches to assessment for sustainable wellbeing serve quite different purposes each appropriate to the teaching-learning context within which it is embedded. In principle, there is no reason why both could not be adapted for use within an SWM. A portfolio or portfolios of evidence approach for NCEA standards assessment could work well for teachers splitting their familiar subject-based content between SWM CCH mode Units and SBS Units to support SWM domain and subdomain goals. As explained in Section 4.5.3.2, elaboration of the Individual-Interpersonal level of the full SWM conception was beyond the scope of this study. The *My Mahi* portfolio approach to self-development and assessment could, however, be the perfect vehicle for the elaboration and realisation of education for the SWM conception of the Integrating Self and its sustainable wellbeing.

Hipkins et al. (2016) also propose a 'portfolios of evidence' approach to assessment for more coherent curriculum design to overcome the NCEA's fragmentation problem. This approach could readily be adapted to cross-curricular courses anchored in SWM subdomains albeit the authors' vision of the source of curriculum coherence did not extend beyond "conveying a deep understanding of a disciplinary epistemology" (p. 206). Even that degree of coherence, as Hipkins et al. concede,

> would certainly have its challenges on pedagogical and political levels. It would not be possible for a single teacher, or probably even a single department, to undertake this approach alone; it would have to be adopted as a school-wide approach.
>
> (p. 207)

The SWM vision of education implies a radical and demanding redefining of secondary school teachers' collective work and their professional identity. A pivot away from current teacher de-skilling policy trends—justified as teacher workload reduction (Stacey et al., 2024), or personalised, consumer-oriented knowledge-as-commodity systems (Hughes, 2021)—would be required. It would require teachers reskilling to become Sustainable Wellbeing team members as well as critical educators with subject-based specialities and digital pedagogical expertise. The redirection of mindsets, energies and resources required for teacher training, professional development, school leadership, NCEA assessment moderators, the ministry, and educators at all levels is not insignificant.

In Section 2.5.3—under the heading *Harmonising Integrated and Collection types through enabling constraints*—I listed Bernstein's (1975, p. 75) four conditions that an integrated curriculum must fulfil if its openness is not to degenerate into a sense of purposelessness and dislocation in time and place for faculty and students. Accepting that these conditions must hold for the CCH mode of an SWM I asked; What might a similar list of conditions look like for a Collection-type curriculum—and by implication the SBS mode of the SWM—if its closedness is not to degenerate into rigid disciplinary silos and an experience of irrelevance, anxiety and loss of agency for faculty and students in the face

[13] *Mahi* when used as a noun in Te Reo Māori translates to English as *work, job, employment, trade (work), practice, occupation, activity, exercise, operation, function* (Moorfield, 2003)

of the accelerating global poly-crisis? In light of this study's findings, I answer this question by suggesting the following four conditions could be added to the SWM vision.

1. There must be an acknowledgement that education for Sustainable Wellbeing is the primary objective of the whole metacurriculum
2. Each Subject and its teachers must be able to show how their choice of curriculum content serves the domains of Sustainable Wellbeing at the level of Humanity and Society and students will be encouraged to seek those connections.
3. Each Subject and its teachers must be able to show how their learning activities support the sustainable wellbeing of their students and students will learn and experience how each subject supports the development of each domain of their wellbeing at the individual-interpersonal level.
4. The criteria for evaluating student achievement within a subject area must be open to including evidence gathered from CCH contexts.

How might this SWM vision of education best be enabled? The following section addresses my third research subquestion exploring the space of the education system Attractor in Aotearoa New Zealand in search of trajectories and strategies of greatest promise for schools and their communities toward a more Sustainable Wellbeing centred approach to education.

## 7.4 Strategies for an SWM Framework Phase Transition in Aotearoa New Zealand Schools

### 7.4.1 Section Overview

RQ3—Research sub-question 3 asked:

How can the uptake and development of the co-constructed SWM framework for years 11 to 13 students amongst Aotearoa New Zealand secondary schools best be enabled?

Research sub-question 3 addresses the reality that curricula and assessment systems are inextricably embedded within and dependent for their relevance upon schools as complex adaptive physical, social and cultural systems. The SWM is a whole-school concept which involves not only the school's curriculum and pedagogy but also the working relationships of all its people to one another and its physical structures and natural environment. The uptake and development of the co-constructed SWM framework is inextricably bound up with this complex whole-school system as the findings from chapters 5 and 6 have demonstrated.

Throughout this thesis, I have used the Lorenz strange attractor, first introduced in Section 2.3.4.2, to represent New Zealand's secondary schools as a system currently in an unsustainable but also continually evolving BaU configuration, analogous to Figure 2-2. Imagine that the basin of attraction on the right of Figure 2-2A represents the traditional dominant Subject-Based Specialist (SBS) mode of secondary school education—where analysis, disciplinarity in itself, and mastering the powerful conceptual knowledge of the disciplines, are prioritised—while the basin on the left represents the minority Cross-Curricular Holistic (CCH) mode—where synthesis, cross-curricularity in principle, and fostering the agency, competencies, talents and creativity of individual students are prioritised. Neither basin of attraction in this configuration centres Sustainable Wellbeing as the ultimate purpose

of education although both may mine it for useful contexts. Some schools on the dark blue trajectories remain trapped in the right-hand SBS basin while others on the light blue bi-modal trajectories alternate unpredictably between the two basins and modes of teaching and learning.

The attractor analogy suggests that the system might be encouraged and nudged toward a tipping point phase transition to a sustainable SWM attractor configuration resembling Figure 2-1. Not only are all schools accessing both basins in this configuration, but the powerful knowledge of subjects and the creative, agency of individuals are brought into a mutually reinforcing focus on the collective purpose of re-establishing humanity's connection with planetary harmony and Sustainable Wellbeing. The alternative phase transition to be avoided can be imagined as the SBS basin gathering ever more mass and the CHC basin becoming ever more egotistically disconnected until the two separate entirely and the whole attractor vanishes down a BaU reductionist black hole. Robbins and van Wynsberghe (2022) raise the possibility of this sort of total social system collapse being precipitated by our currently developing 'lock-in' dependence upon AI and the energy-intensive infrastructure that makes it possible. That collapse seems inevitable If we cannot apply AI rapidly and effectively enough to help solve the socio-political problem of our fossil-fuelled energy system dependence which is ultimately a consequence of our disconnections from nature, one another and personal identification with the evolution of our species.

The findings of this study suggest six strategic directions teachers and school leaders might use or are using to move secondary schools currently restricted to the SBS basin of attraction—on what I have called Prospective, Realpolitikal, and Innovative trajectories—toward finding their tipping point into Explorative trajectories that traverse both the SBS and CCH basins of attraction. Explorative trajectories imply that some or all of a school's years 11 to 13 students are following a bimodal timetable that aligns with parts or all of the SWM framework. With each school's transition to an Explorative trajectory, I suggest, the whole education attractor system moves closer to a BaU to SWM phase transition. The following list of suggested strategies should not be read as a prioritised checklist, nor is it intended to be exhaustive. It represents a synthesis of the strengths of the eight schools that provided the basis for the principal components analysis presented in Table 6-14 and Table 6-15. These strategies are mutually reinforcing, but their prioritisation and manner of integration would also necessarily remain dependent on the local context of any school looking to apply them.

### 7.4.2 Disaggregation for large schools

While the schools of the teachers who participated in the first phase of this study were broadly representative in their distribution of total roll size of all New Zealand schools with years 11 to 13 students, the schools of those that persevered to the third phase of this study and provided exemplar Unit outlines using the SWM framework, were significantly smaller. As reported in Section 6.2.4.1, the latter group of SWM Unit schools range in size from about 100 to 1,000 students, but the majority of students in Aotearoa New Zealand, are enrolled in the larger schools with rolls of over 1,000. Furthermore, the median size of the SWM Unit schools is closer to the roll size experienced by students on average at around 670. In the general population, secondary school education is dominated by a few very large schools. Consequently, the median school roll is only 421 for the 505 'All-Other' schools in this study, but students on average experience school rolls of 1,039.

Eames, Roberts, et al. (2010) similarly found that "Challenges remain for: fostering EfS in large primary and secondary schools" (p. 2). Little appears to have changed in this regard over the intervening twelve years between that study and this. The literature on social networking dynamics reviewed in Section

2.3.5.2 (Bird-David, 2022; Davis & Sumara, 2006; Harré & Prokopenko, 2016; Widlok & Cruz, 2022), provides a plausible explanation for this persistent association of Education for Sustainable Wellbeing (EfSW) with smaller schools. EfSW is intrinsically cross-curricular and collaborative. Interdisciplinary teaching teams, which may also include senior students, work well for this CCH mode of pedagogy where they are institutionally supported as I found, for instance, in the cases of Rebecca, Anita, and Brent's schools. Dynamic Egalitarian groups, which are cognitively, affectively, and logistically limited to groups of at most 130 individuals (Harré & Prokopenko, 2016), possess the features of dense neighbour interactions and shared, decentralised authority that fosters the sort of self-organising complexity required for effective team teaching. Furthermore, Dynamic Egalitarian groups are more responsive and flexible in times of system change than the Hierarchical Dominance networks typical of large disciplinary departmentally organised schools. In times requiring rapid transformation related to diverse local contexts, they are strategically more appropriate. The limiting factor for successful CCH team teaching in large schools may not therefore be student numbers but teacher numbers and their capacity to form cohesive collegial networks. Based on teacher-student staffing ratios data available from the NZ Ministry of Education (2024b), in a school of 1,039 students, the Full-Time Teacher Equivalents (FTTE) on staff are likely to be in the range of 70-85, that is, well within the 130 persons Dynamic Egalitarian group absolute limit. At student numbers over2,080 the number of FTTE on the staff is likely to exceed 130.

These insights from EfS research and social networking theory suggest that an effective strategy for fostering Education for Sustainable Wellbeing in larger mainstream high schools could be partial disaggregation into vertical multiple-year group streams based on a choice between SWM or BaU programmes. Indeed, a very similar form of disaggregation strategy was adopted by Brent's school in establishing their Years 9 to 10 Innovation Stream curriculum, albeit this stream did not adopt the bimodal timetable distinction between CCH and SBS lessons as proposed for the SWM in Section 7.2.3. The challenge of winning over the parent and student community to accept that academic achievement need not be compromised in opting for the SWM stream would remain but schools like Rebecca's already provide successful exemplars. Once an SWM stream was established within a large school, a bimodal CCH-SBS timetable for the SWM framework stream could be introduced for all year levels in the stream. Bi-modal timetables were operating already in four of the Core schools in this study although only in Rebecca's was the CCH mode specifically reserved for the Sustainability and Wellbeing programme.

### 7.4.3 Collaborative Aggregation for Small Schools

At the high end, a total roll of not more than 1,000 students appears to favour the development of an SWM within a school but there are also roll-related limitations at the low end. The smallest of the Core schools in this study, Tara's and Daniel's, had rolls of 98 and 162 respectively. Both experienced constraints on the range of subject areas they could provide for students as a consequence of the roll size limits on the number of teachers they could employ. Even Anita, whose school's roll was 641 specifically mentioned this constraint. This limitation on the breadth of teacher subject expertise is exacerbated by the wide range of year groups in these schools. Both Tara and Anita's are composite (K-13) schools which means there are few senior students. There were just fifteen students in years 11 to 13 at Anita's school.

The suggested strategy to overcome the constraints of small rolls is aggregation and cooperation among schools which is the intent of PC5 in Table 6-14. Aggregation of resources is also powerful for

schools needing to access land on a sustainable basis for school gardens and restoration projects as Anita and Rebecca's schools have experienced through their city's Climate Action campus. Tara's school could, for instance, find mutual benefit in sharing its access to land with other local secondary schools in exchange for access to a wider range of secondary school teacher subject expertise.

### 7.4.4 Trades Academies

Daniel's Trades Academy and others like it such as Whenua Iti Outdoors and Top of the South Trades Academy solve their limited student numbers challenge with a quite different aggregation strategy which could prove crucial to the success of an SWM for secondary schools in Aotearoa. These Academies partner with secondary schools by offering outdoor education and nature-connectedness courses with practical expertise that classroom-trained teachers often lack. PC5 comprises two factors. 5.2, the strength of Sustainable Wellbeing Collaboration with other schools, is one. The other is 5.1 the strength of Mātauranga Māori and multi-cultural awareness and inclusion in the school. Both Daniel's Academy and Whenua Iti Outdoors have their origins in Te Ao Māori—the Māori worldview—and the intimate connection between Mātauranga Māori (Māori knowledge) and the whenua, meaning the land in English but also the placenta which connects the whenua to Papatūānuku the earth mother. The connection of factors 5.1, Mātauranga Māori and 5.2 Sustainable Wellbeing Collaboration is consistent with a contrast between the transitory utilitarian way the current dominant Pākehā BaU worldview tends to treat work relationships and the place they have in Te Ao Māori. "From a Maori perspective, the relationship is the thing, the project is a focus for building and maintaining the relationship rather than vice versa." (Bell, 2024, p. 29) For the SWM, the project, Sustainable Wellbeing, also fosters this long-term understanding of all human relationships.

Daniel's Trades Academy courses also specifically combine academic with vocational qualifications in a way that dissolves the unhelpful distinction between classes of knowledge for different social classes of students. This attribute was specifically recognised in PC4 NCEA for Sustainable Wellbeing with Project-Based Learning. Students who will eventually enter distinct domains of employment requiring distinct occupation-related skills, at this level of their education can experience and understand together the interdependence of cognitive, affective, and practical knowhow that will be required if they are to effectively meet the present and coming challenges of climate change and Sustainable Wellbeing. A further strength of Trades Academies may be that they offer a solution to the underrepresentation of male students among the schools currently exploring education for Sustainable Wellbeing. Daniel's Academy was the one 'school' in the Core Group in which boys were decidedly in the majority when it was first established. It should be noted here that PC4 comprises three factors, one of which is 4.2 the timetabled provision for CCH, student-led project-based learning in the timetable.

While Daniel's Trades Academy's courses are eligible for funding assistance through the Ministry of Education's STAR and Gateway schemes for schools they do not rely solely on the government or on charging tuition fees for their funding. Engaging students in profitable sustainable wellbeing enterprise as part of their education is also intrinsic to the Academy's founding Kaupapa as described in Section 5.3.7.

### 7.4.5 Emulating SWM Explorative Whole School Characteristics

For schools that consider themselves as entering or already on an SWM Explorative trajectory, the SWM factors that make up PC1 People, Programmes, Practices, and Place, could provide a useful initial strategic checklist. As shown in Table 6-14, PC1 is a set of eight closely correlated Whole-School factors

that most effectively predict a high SWM ranking. The People factors include; 1.1 the value placed on nurturing student voice in school life including curriculum development; 1.3 the extent of and structural support for CCH team teaching at all year levels in the school; 1.4 the strength of community relationships and links with community organisations supporting the School's SWM. The Programmes factors include; 1.2 the range of Subjects and year levels involved in CCH Sustainable Wellbeing Units; and 1.8 the extent of Ecosphere-related learning and Education Outside the Classroom (EOTC) activities across subjects and year levels. The Practices factors include; 1.5 the use of mentoring, portfolios and self-reflection for student competency development; and 1.7 alignment between the school's values and Sustainable Wellbeing. The one factor of Place is 1.6 commitment to on-campus and local environmental sustainability practices.

My analysis based on these eight PCA schools confirms the appropriateness of the phrase People, Programmes, Practices, and Place which as applied by Eames, Barker, et al. (2010) to define the four dimensions of their 'whole-school approach framework' for EfS. Eames, Barker, et al. defined a list of 3 to 10 underlying aspects for each of the dimensions in their framework. Many of these aspects align with the SWM proximity factors I have listed above but some with quite different emphases and levels of detail reflecting most likely the different sets of case study schools, research methodologies, and the twelve years that have passed between the studies in a rapidly evolving educational space.

### 7.4.6 School and Teacher Leadership for Sustainable Wellbeing and Student Agency

As noted in Section 6.4.3, nurturing the development of secondary school students' agency and emerging Integrating Selves requires a complex mix of teaching skills. Three of the SWM proximity PCs and five factors from this study relate to how schools and teachers are managing this professional responsibility within curricula that prioritise Sustainable Wellbeing. The significance of fostering student agency for sustainability in the Anthropocene is increasingly recognised as a global priority (Koskela & Paloniemi, 2022; White et al., 2023)

The highest ranked factor in the first principal component was 1.1 the value placed on nurturing student voice in school life including curriculum development. This factor is about teachers encouraging students, especially senior students, to think about the sustainable wellbeing of the school community as a collective and facilitating their agency in contributing to its direction. The metacurriculum is in part a curriculum about its own emergence enacted through continually questioning the meaning of Sustainable Wellbeing in immediately relevant contexts. The opportunity students are given to follow their individual inspirations and passions, within the overall kaupapa of Sustainable Wellbeing, is expressed in factor 4.2 the timetabled provision for CCH, student-led project-based learning in the timetable; already mentioned in connection with Trades Academies in Section 7.4.4.

The third PC that addresses student agency expresses it in terms of its relationship to their teachers' Agency and commitment to Sustainable Wellbeing as the school's highest value.

This PC comprises three factors; 3.1 the practice of Sustainable Wellbeing-oriented core curriculum requirements for all students; 3.2 the extent to which the Sustainable Wellbeing curriculum elements extend into year 11 to 13 classes; and 3.3 the emphasis placed on Students' choice and Subject options. Schools that have made the SW components of their curriculum mandatory through to year 13 scored high on 3.1 and 3.2 but low on 3.3. Factor 3.3 is, of course, the one factor in this set of nineteen for which most BaU-oriented, SWM Prospective schools will score highly.

PC3, ‘School Leadership for SW’, appears to be an important and perhaps even essential strategy for the durable implementation of an SWM. Apart from Anita’s school, which had the lowest score, the top five schools all scored positively on PC3. On a global level, education’s potential to contribute to surmounting our Sustainable Wellbeing crisis is not highly rated. The recent IPCC Synthesis Report (Calvin et al., 2023) makes only a brief mention of Climate Change Education. “The full report positions education more as a co-benefit from solutions to climate change rather than a prime driver” (Eames & Bolstad, 2023, p. 1). This general perception of education’s purpose is consistent with the “lack of organised and committed educational leadership for environmental and sustainability education” (Shephard et al., 2024, p. 333) in Aotearoa New Zealand. Consequently, “many developments occur with a pronounced bottom-up emphasis, based on the enthusiasm of individuals and small groups but naturally lacking integration, interconnectedness or unified oversight” (p 333). The participants and schools in this study on what I have described as the ‘Explorative’ trajectory are examples of such enthusiastic individuals and small groups. Their leadership strategy requires providing students with maximum scope for the expression of their independent, collective, and physical agency within the broad but firm boundaries set by school leaders' and teachers' interpretations of Sustainable Wellbeing. This is only possible if those leaders and teachers have a sincere personal commitment to the kaupapa and ongoing professional development to support it. Hipkins et al. (2016) make a similar observation about the professional demands on New Zealand teachers of senior secondary students as curriculum builders and creative users of the NCEA’s flexibility writing, It “implies that every teacher needs to be, to echo NZCs vision, ‘a confident, connected, actively involved, lifelong learner’ themselves” (p. 217).

In this thesis, I position the Sustainable Wellbeing Metacurriculum as an emerging yet still marginal paradigm for secondary school Education. Special Character schools have an advantage over Mainstream schools concerning ‘School Leadership for SW’ in that SW can be their ‘point of difference’ attracting what are still niche markets of already philosophically and politically persuaded families. Of course, ‘Special Character’ can also work against SW, as Anita’s school's commitment to student choice demonstrates. However, having the courage of one’s convictions appears to be an unavoidable demand of the path toward the SWM configuration, as Brent’s school’s experience with the introduction of its Innovation Stream curriculum illustrates. About 30% of the staff expressed interest in the concept when it was first floated by the Senior Leadership Team and he added “We lost teachers along the way who were against the cross-curricular, … [but] Not many”.

### 7.4.7 Working with the Willing

This study depended entirely on the strategy of ‘Working with the willing’. Twenty-three teachers from across the spectrum of educational philosophies took hours out of their already busy professional lives to contribute to help co-construct an SWM framework. ‘Teacher Enthusiasm’, was the most frequently mentioned factor affecting the likely success of an SWM implementation in this study. For the Prospective school teachers, Teacher enthusiasm was seen as both an enabler when present and as a constraint when absent. For the Core teachers as a group the existence of ‘Established SW programmes’ .i.e. already persuaded colleagues, was regarded as the most enabling Factor.

‘Working with the willing’ applies also to students as well as non-teaching staff and community members. The power of students’ agency in developing, supporting and even funding their own education for Sustainable Wellbeing was most effectively demonstrated at Rebecca’s school for instance through its ‘Green Market’ and at Daniel’s Trade Academy through its *Tiaki Taiao*

*Regenerative Enterprise Model of Learning.* As Rebecca observed, "When students are given the opportunity to lead, and some time, regardless of their age, they achieve great things!". Of all the strategies discussed in this section, 'Working with the willing' is probably the most obvious, and most effective.

## 7.5 Enabling a Sustainable Wellbeing-Centred metacurriculum

### 7.5.1 Section Overview

The overarching question guiding this research project was;

What would enable secondary schools in Aotearoa New Zealand to establish a Sustainable Wellbeing centred Metacurriculum (SWM) for their years 11 to 13 students?

The three subquestions discussed in the previous three sections each addressed aspects of the overarching question of particular relevance to teachers, teacher collaboration, and whole school leadership within New Zealand's education sector. First, what is an 'SWM framework'? Second, How does it relate to the existing national educational curriculum and assessment systems? And third, what strategies might be most effective for implementing an SWM across the diverse range of New Zealand Secondary schools? The project's main question requires that we also consider the full social and cultural context secondary schools serve and within which they operate. The findings discussed in this section represent the views of all twenty-two of the phase 1 participants in the study as detailed in Section 6.3.

### 7.5.2 Enabling an SWM and SWM-directed Change

#### *7.5.2.1 School Factors*

When asked what would need to change in your school, to enable the implementation of an SWM? the most needed change mentioned by both the Prospective schools' and the Core group teachers was; A 'Convincing argument and plan'. This finding aligns with the conclusion reached about Twenty-First Century Future-Focused curriculum in general and Education for Sustainability specifically by writers previously cited in this thesis (Agbedahin & Lotz-Sisitka, 2019; Fadel & Groff, 2019; Reimers & Chung, 2016). Individual schools, including Mainstream State secondary schools with strong leadership, are certainly capable of implementing significant progressive reforms as the case of Brent's school demonstrates. However, outlining and communicating a system change for schools on the scale envisioned by the SWM is principally the responsibility of the Ministry of Education and, as already noted, leadership for Sustainability Education at the national policy level is not strong in Aotearoa New Zealand (Shephard et al., 2024). The second and third most mentioned changes needed to enable the implementation of an SWM, also common to both groups of teachers, were Sufficient Time to plan and make the changes required by an SWM followed by the provision of relevant Teacher training the resourcing of which is also primarily the government's responsibility but also a matter of school leaders priorities. The SWM framework co-constructed with teachers in this study and the strategies for schools transitioning to SWM-attractor trajectories are offered to educators at all levels, particularly school leaders, as pragmatic first steps toward assisting them in developing and promoting their own 'Convincing arguments and plans'.

Although ‘Teacher Enthusiasm’ as an enabling factor for an SWM, or constraining when absent, was important for both groups of teachers, it was more often mentioned by the Prospective schools’ teachers along with a lack of ‘Senior Leadership team support’. For the Core group teachers ‘Established Sustainable Wellbeing programmes’ was the most enabling factor. These teachers were more concerned about potential constraints at the nationwide level like the current reforms of the New Zealand Curriculum and the National Certificate of Educational Achievement being undertaken by the government, and insufficient teacher professional development focused on Sustainability and Wellbeing.

#### *7.5.2.2 Community Factors*

For the ‘Prospective’ schools’ teachers, Community Support was the most mentioned Enabler and allaying parent, student and community fears around Qualification and Employment opportunities being undermined by an SWM education was the most important factor for enabling Change at the local Community level. For the Core teachers already actively engaged in exploring education for Sustainable Wellbeing, the challenge of ’School and Community Logistical Separation’ was the most important constraint to overcome and the factor considered most significant for the Changes they had achieved and those that were yet to be achieved was ‘Community Education and School Outreach’.

In talking about Education for Sustainable Wellbeing we are inevitably addressing existing community anxieties around the complex systemic implications of Climate Change as well as perceptions about individual student’s career prospects. The vision must be clear, evidence-based (as far as possible at this early stage), communicated well, and invite deliberative and action-oriented engagement across the community if it is to be collectively understood, persuasive, counter competing narratives, and gain momentum (Berentson-Shaw, 2019; Climate Council of Australia, 2024; De Meyer et al., 2021; University of Auckland, 2022)

#### *7.5.2.3 Nationwide Factors*

At the national-societal level, the differences between the Prospective and the Core school teachers' views on enabling and constraining factors were more contrasting. The ‘NCEA and NZC’ and their respective ongoing government reviews were most mentioned by both groups but more often regarded as potentially enabling for an SWM by the former and as potentially constraining by the latter. This may reflect an underestimation by teachers in the Prospective schools of the challenges involved in the implementation of a whole-school SWM in which the CCH timetable mode has a significant role. The second most mentioned enabler by the Core teachers—again reflecting their very different trajectories within the BaU educational attractor configuration—was assertive ‘Political Will and Persuasion’. The Prospective school teachers saw insufficient ‘Teacher PLD and Resourcing’ as their most constraining factor. This finding suggests that exercising agency to transform the status quo of comfortable BaU assumptions may be the first step for school leaders toward addressing the Sustainability crisis, whether or not ‘Teacher PLD and Resourcing’ are deemed to be sufficient, yet. Engagement with Political Ecology is increasingly being viewed as a priority for the future of Environmental Education (Hart, 2024).

Both groups prioritised ‘Educational Purpose and Values’ as the most important change required at the nationwide level to enable the implementation of an SWM. The Core teachers, however, were more likely to write that the Change required was toward specific purposes and values consistent with the special character of their schools while the Prospective teachers—who more likely represent the

current majority of teachers—were more circumspect suggesting that the change required was a heightened public awareness of and engagement with the issue. Here again, the work of the authors cited in the previous section is especially relevant.

### 7.5.3 The meaning of 'Sustainable Wellbeing'

The importance of fostering a broad public conversation on the purpose of Education is central to the vision of an Sustainable Wellbeing Metacurriculum. If a group can agree, as the participants in this study did, that Sustainable Wellbeing is a desirable purpose upon which to centre a metacurriculum for years 11 to 13 students, the meaning of the phrase 'Sustainable Wellbeing' remains, and must remain open to individual interpretation and imagination. The ideal implicit in the word metacurriculum is that all citizens need to be informed about all points of view and have the opportunity to be represented in the public conversation.

In the first section of the first Delphi survey round of this study, the twenty-two participants, including those that eventually became the Core group, gave a diverse range of answers to the question "What does the term 'Sustainable Wellbeing' mean to you?", as presented in Table 4-2 of Section 4.3.4. Responses ranged from being limited to the physical and economic health of individuals through to an expansive vision that included Self-fulfilment and Duries's Te Whare Tapa Wha concept of Wellbeing (which includes physical, emotional-mental, Social and Spiritual aspects) not just for each individual but also for humanity as a whole and the entire biosphere. Effectively the latter more engulfing conception of 'Sustainable Wellbeing' is the consensus view represented in the SWM framework that had taken shape by the completion of this study's third phase.

The arguments of this thesis are based on four foundational premises. The central purpose of education is the attainment of 'Sustainable Wellbeing' which includes continual exploration for a unifying understanding of its meaning. Second, the Sustainable Wellbeing(s) of individuals, of humanity as a species, and of the Earth as a being, are mutually reinforcing outcomes within one complex, adaptive, biospheric system. Third, as a species, we have failed to realise and act in accord with premise two which—as we approach an unprecedented maximum global population—has led us to an accelerating self-induced existential crisis. Fourth, significant educational reform, centring Sustainable Wellbeing, especially for senior secondary school students, has an indispensable role to play in minimising the destructive impacts of the crisis and turning it into an evolutionary opportunity.

This study has shown, through theorising and teacher voice, that collectively we have the necessary conceptual, human and natural resources to achieve that significant educational reform. Whether we do or not, as ever, only time will tell. Even given the widespread acknowledgement that the crisis is real and anthropogenic, the outcome for humanity remains an unpredictable battle between what many of my participants described as reluctant mindsets and positive mindsets, in education as in daily life. As Lucy put it in criticising the trivializing effect of NCEA credit accumulation on learning. "We need to be brave and make a huge leap for change".

This leap involves, I suggest, people of all cultural backgrounds finding the will to be educated about other worldviews and the courage to aspire to an inclusive synthesis which values the diverse wealth of human cultures while at the same time building a global unified view prioritising the Sustainable Wellbeing of humankind. The holistic impulse of complex systems-critical realist-new materialist thinking has the potential, I believe, to form the necessary spiritual/conceptual bridge between the Western analytical specialised disciplinary view of knowledge and Mātauranga Māori and other holistic Indigenous worldviews. The aspiration is, in the words of Paulo Freire, "cooperation rather

than conquest, unification rather than division, organization rather than manipulation, and cultural synthesis rather than cultural conquest" (Freire, 1968/2015 quoted in Williams, 2023)

## 7.6 Conclusion—The Co-Construction and Enabling of an SWM

My overarching focusing question in this thesis is "What would enable secondary schools in Aotearoa New Zealand to establish a Sustainable Wellbeing centred Metacurriculum (SWM) for their years 11 to 13 students?". I have framed my answer to it in four steps based on three subquestions relating to the implications of an SWM for teachers and schools and a final step relating to the local communities and national context within which New Zealand secondary schools function. The three subquestions can be paraphrased as; What could a co-constructed framework for an SWM look like? How would it relate to the existing New Zealand Curriculum (NZC) and National Certificate of Educational Achievement (NCEA) curriculum and qualification systems? And what strategies might teachers and school leaders adopt to facilitate the uptake of an SWM?

A Framework for a Sustainable Wellbeing Metacurriculum was proposed that located Sustainable Wellbeing at the centre of the curriculum and teachers were invited to participate in its co-construction. In each of the three phases of the study, participants were asked to evaluate the usefulness of the emerging framework for curriculum planning and their views on what factors would enable its implementation in their school, local community, and Aotearoa New Zealand.

A theoretically-based minimal framework was developed as a system of two levels—the human-societal and the Individual-Interpersonal—with three corresponding domains at each level. The participants' input then led to consensus about the three domains at the human-societal level; Ecosphere, Social Justice, and Cultural Vision organised around the concept of Sustainable Wellbeing as an integrating attractor; and three corresponding domains at the Individual-Interpersonal level; Action, Feeling, and Thinking organised around the concept of the Integrating-Self.

The co-construction process added a system of nine subdomains at each level and differentiated the Individual-Interpersonal level into two orientations, inter and intra. The subdomains emerged as a self-similar structure, fractally related to their domains at each level based on the dimensions of space (for the Ecosphere and Action), social scale (for Social Justice and Feeling), and time (for Cultural Vision and Thinking). The fractal structure of the framework enables the metacurriculum to coherently model the complexly interwoven and nested nature of human experience and the so-called 'wicked problems' of Sustainable wellbeing such as climate change, in a way that is scalable and adaptable and keeps all domains in view regardless of the context of the problem being addressed.

The SWM minimal framework included a proposed bimodal timetable involving some proportion of Cross-Curricular Holistic (CCH) lessons relative to Subject-Based Specialist (SBS) lessons. The mean timetable share for the CCH mode suggested by participants was 39% but the distribution of preferred proportions was distinctly bimodal. Teachers favouring a greater share for the CCH mode tended to see the SWM subdomains as the starting points for Unit planning around which subject concepts and content would be integrated as required. For those teachers favouring the SBS mode, subject concepts and content tended to be their planning starting point with the SWM framework domains and subdomain knowledge, issues, and big ideas integrated when relevant as contexts.

Relating the co-constructed SWM framework subdomains to the existing NZC and NCEA school leaving qualification was limited first by the number of exemplar teaching Unit outlines that the study participants could make available to this study, second by the priority they gave to the Ecosphere Domain, and third by the range of subject specialities they represented.

Of the six exemplar Unit outlines provided to this study, five were anchored in the SWM Ecosphere subdomains with one in the Social Justice subdomain of Equity, Rights and Responsibilities. Participants nominated Connected subdomains for their Units across all nine framework subdomains but there was insufficient data to test for correlations between these connected subdomains and learning Areas. The teachers linked their Ecosphere Anchoring subdomains mainly to the NZC and NCEA learning areas of Technology, Social Science, Science and Health and Physical Education. Plausible linkages between the SWM Social Justice and Cultural Vision subdomains and the learning areas of the Arts, Languages, English and Mathematics cannot be confirmed by this study for lack of exemplar Units anchored in those subdomains. Innovative assessment options suggested by teachers for SWM Units included cross-curricular suites of NCEA Education for Sustainability (EfS) achievement standards with trades-oriented unit standards. Student-curated self-assessment and self-development portfolios were in use at two schools and could be especially appropriate for supporting the Individual-Interpersonal level of the SWM.

This study has identified key synergistically interrelated strategies that teachers and school leaders are using or could adopt to facilitate the uptake of an SWM in their schools. How these strategies might be best applied depends on what I have described analogically—using the Lorenz strange attractor image of Figure 2-2—as a school's current trajectory within the evolving attractor of the New Zealand secondary schooling system. Four broad groups of trajectories—Prospective, Realpolitikal, Innovative, and Explorative—have been defined based on the demographic attributes of the study participants' schools, the insights teachers provided about sustainable wellbeing education in their schools, and how teachers thought the co-constructed framework might be viewed by their colleagues.

The strategic directions can be thought of as facilitating the transition of Prospective and Realpolitikal schools to innovative trajectories, Innovative schools into Explorative trajectories and Explorative schools toward more complete expressions of what I have described as an emergent SWM configuration of the entire secondary schooling system attractor. The attainment of an SWM configuration would mean a phase transition of the education system attractor from its current BaU state to a state in which most or all schools have adopted a bimodal CCH-SBS timetable oriented toward whole-school SWM for some or all of their year 9 to 13 students.

The six strategic directions are; Disaggregation for large schools; Collaborative Aggregation for Small Schools; Trades Academies; Emulating SWM Explorative Whole School Characteristics; Teacher Leadership for Sustainable Wellbeing and Student Agency (which can mean purposefully restricting students' choice of subjects); and Working with the Willing. Neither this set of directions nor the four school trajectory categories are presented as complete lists of all possibilities within the secondary schooling space. They represent an impression of the space as it was in 2021-23 based on the data that was available to this study. The fourth direction; 'Emulating SWM Explorative Whole School Characteristics', refers to a set of eight correlated factors characteristic of the successful SWM explorative schools that I have summarised under the label 'People, Programmes, Practices, and Place' and detailed in Table 6-14. They include the value placed on nurturing student voice in school life including curriculum development; the extent of and structural support for CCH team teaching at all year levels in the school; the range of Subjects and year levels involved in CCH Sustainable Wellbeing Units; commitment to on-campus and local environmental sustainability practices; and the extent of Ecosphere-related learning and (Education Outside the Classroom) EOTC activities across subjects and year levels.

The establishment of a Sustainable Wellbeing centred Metacurriculum for years 11 to 13 students in Aotearoa New Zealand depends ultimately on the goodwill of and material support from schools' local

communities and government policies. While the Prospective schools' teachers and the Core group teachers had different perspectives on what would be most enabling for an SWM reflecting their different stages of progress toward an SWM, they agreed about some key aspects of education that would need to change. A 'Convincing argument and plan' for change was the need most mentioned by both groups, followed by sufficient Time to plan and make the changes required, and the provision of relevant Teacher training. At the community level for the Prospective schools' teachers, a lack of Community support and community fears around Qualification & Employment opportunities being undermined by an SWM were the most often mentioned constraints. For the Core group teachers, 'School and Community Logistical Separation' was the most mentioned constraint while 'Community Education and School Outreach' was considered the most needed change strategy. At the national level, both groups mentioned the government's current reviews of the NZC and NCEA curriculum and qualifications systems as having significant implications for an SWM, the Prospective school teachers with optimistic expectations and the Core group teachers from a more cautious pessimistic perspective. Both groups considered 'Educational Purpose and Values' as the key factor for change, the Prospective school teachers calling for greater public awareness of and engagement with the question and the Core group teachers emphasising the Sustainable Wellbeing values already enshrined in their school's particular special character.

The phrase 'Sustainable Wellbeing Metacurriculum' has been employed in this project for its potential to provoke exactly the conversation around Educational Purpose and Values that the Prospective school teachers were suggesting but also to provide a focus for collective vision building with the power to actualise an SWM phase transition for secondary education in this country. The pioneering work and strategic directions of some of the first responders in this transition have been showcased in this study in the hope that other educators will feel informed, inspired and empowered to join the exploration.

## 7.7 Limitations of the Study

### 7.7.1 Research Design limitations

#### *7.7.1.1 Self-selection sampling bias*

The recruitment strategy for this study was self-selection partly through targeted invitations to individuals with an acknowledged interest and expertise in Education for Sustainability and partly through open invitations posted on teacher professional subject-based Facebook User groups. While this strategy ensured that the study participants belonged to my target population, i.e. teachers of years 11 to 13 students with a professional interest and possibly expertise in Education and curriculum design for Sustainability and Wellbeing, it also meant that key stakeholder groups within that population could not be systematically sampled. When some stakeholder groups turned out to be underrepresented in the panel of twenty-three teachers who accepted the invitation to join the study there was very little basis for secure inferences about whether these underrepresentations were an important empirical characteristic of the target population, a random statistical effect (due to the small sample size), or somehow related to the channels used and prospective panellists' inferences about the researcher's demographic profile and affiliations, i.e. Pākehā, male, semi-retired, secondary school teacher.

The key stakeholder groups underrepresented in my participant group are Māori teachers (there are none), Mathematics and Languages Teachers (other than English), and Male teachers although their proportion improved to be three out of the nine core participants in phase 3 of the study. Amongst the student populations of the study participants' schools, European/Pākehā were significantly overrepresented. Would this have been less extreme if there had been Māori teachers in the Delphi panel? Probably is my guess, but that's only a guess.

The underrepresentation of males also appears to be characteristic of the target population both among teachers and among students where the gender balance in participants' schools increasingly favoured girls with each succeeding phase of the study.

#### *7.7.1.2 Sample Size*

Twenty-three teachers representing twenty-two schools participated in this study. While this is adequate for a Delphi study, it was limiting for the confidence with which inferences related to the participants' schools could be drawn in the demographic analysis of Section 6.2, particularly for the Unit group of schools which numbered only seven.

#### *7.7.1.3 CCH and SBS Project/Course Terminology*

My use of the terms 'project' and 'course' to refer to teaching units belonging to the Cross-Curricular Holistic (CCH) and Subject-Based Specialist (SBS) practice modes of the SWM timetable proved inappropriate in phase 1 of the study and I replaced both with the generic term 'SWM Unit'. This too, however, was potentially ambiguous since the term "Unit" is commonly used to refer to a particular type of Standard within the NCEA framework that could also be included in teachers 'SWM Units'. In any future study, I would recommend referring only to courses and allowing that "courses" may include projects or even be projects. Groups of courses can be referred to as programmes.

### 7.7.2 Being Overambitious

From the outset of this study, I realised that I was asking a lot of the modified Delphi research design and of my participants, in terms of the level of detail I hoped to achieve in the SWM framework by the end of the third Delphi round. As discussed in Section 5.5.2, in all phases of the study I monitored carefully, how participants were feeling about the time I was asking them to put into the study. The original design did not include semi-structured interviews but was a modification that proved necessary for me to understand the diversity of school contexts in which my participating teachers were working.

## 7.8 Recommendations for Policy, Practice, and Further Research

### 7.8.1 Policy

The fostering of greater public awareness and engagement with the question of the purpose of education, that my teacher participants were calling for, is ultimately the responsibility of our elected representatives. Currently, in Aotearoa New Zealand the educational policy debate is fractious and polarised. The disconnect between the holistic intentions of the front half and the disciplinary focus of the back half of the NZC (NZ Ministry of Education, 2007) noted in Section 1.4 has if anything only increased. The curriculum and assessment debate in New Zealand education has morphed from being about integrated type Twenty-First Century—Future-Focused (21CFF) curriculum versus collection type Social Realist—Powerful Knowledge (SRPK) curriculum to now include in 2024 a distinct racial and cultural axis that pits New Zealand's holistic Indigenous mātauranga Māori (NZ Ministry of Education, 2022b) against the disciplinary oriented 'science of learning' (NZ Ministry of Education, 2023c).

At the time I was gathering the data for this study in 2021-22, the then Labour-led government had put in place review processes for both the NZC (2007) and the NCEA qualification—the Curriculum refresh (*Te Mātaiaho*) and the NCEA Review of Achievement standards (*RAS*), respectively. Both reviews are ongoing as I write in January 2025. In te reo Māori. "'Mātai' means to study deliberately, examine, and observe, and 'aho' describes the many strands and threads of learning." (NZ Ministry of Education, 2022b, p. 24). These reviews were intended to address, amongst others, the problems of insufficient curriculum coherence (NZ Education Review Office, 2012, 2018) exacerbated by the curriculum fragmentation effect of the NCEA (NZ Ministry of Education, 2023b), which are also central objectives for this study.

In November 2023 the Labour government was voted out by New Zealanders in favour of a National-Act-New Zealand First coalition and a significant shift in the guiding values of the nation's education policy took place. Before the change of government In March 2023, Mātairangi, the guiding kaupapa of *Te Mātaiaho* was described by the NZ Ministry of Education (2023c) as;

> The overarching kaupapa, expressing the centrality of Te Tiriti o Waitangi and its principles, and New Zealand's vision for education
>
> (p. 6)

'Kaupapa' has many possible translations into English (Moorfield, 2003). The most appropriate in this context are 'policy, plan, or purpose'. By August 2024 following the change of government, Mātairangi had been reworded by the NZ Ministry of Education (2024d) to remove reference to the Treaty of Waitangi and had become;

> The overarching kaupapa guiding the curriculum, based on the science of learning and ensuring excellent and equitable outcomes for students.
>
> (p. 7)

Mātairangi is the principal component of seven in *Te Mātaiaho* another of which was Mātaiaho. In the 2023 version of *Te Mātaiaho*, Mātaiaho was described as;

> Weaving learning within and across learning areas. The purpose, big ideas, knowledge, and practices for each of the eight learning areas.
>
> (p. 6)

In the 2024 version, the emphasis on the cross-curricular interweaving of learning areas had been removed from the Mātaiaho descriptor, and replaced with;

> The eight learning areas, which each include a purpose, big ideas, knowledge, and practices, year-by-year
>
> (p. 6)

For the Sustainable Wellbeing Metacurriculum, both mātauranga Māori and the science of learning have vital contributions to make to the education of our young people and neither alone is sufficient. Both cross-curricular synthesis inspired by the imperative of Sustainable Wellbeing and subject-based analysis founded on disciplinary concepts will be necessary in the refreshed NZC if it is to meet the needs of students who are confronting the disconnection crisis of our times. These components of education are related as are the ridgepole and roof of a building to its supporting columns and walls. The present curriculum is like a temple with no roof. The work of co-constructing a framework that can integrate the whole structure coherently has only just begun. The forces driving the turmoil, uncertainties, and disruption of this time are only expected to build and persist in the years and decades ahead. Now is the moment for all to overcome partisan ideological vacillation, transcend the reversals of our three-year electoral cycle, and step back to reconsider how the wisdom, knowledge, and values in the multicultural roots of our society can be focused in mutually supportive ways on the goal of Sustainable Wellbeing and nurtured through our secondary school education system.

Based on the findings of this study, I recommend that the Aotearoa New Zealand parliament seek a durable multi-partite consensus on the need to foster and maintain an informed public conversation on the purpose of secondary school education. This conversation should include:

- Consideration of the meaning and value of Sustainable Wellbeing and a Sustainable Wellbeing Metacurriulum.
- Consideration of changes to national education regulations and policies to make EfSW, including regular EOTC, a legal entitlement for all students and a core element of the NZC for all years from Early Childhood through Year 13.
- Consideration for requiring the current NZC Curriculum Refresh and NCEA Review of Achievement Standards processes to prioritise support for curriculum coherence centred on Sustainable Wellbeing and in all future reviews of the NZC principles and Achievement Objectives, and of NCEA unit and achievement standards.
- Consideration for supporting teacher education by requiring that Education for Sustainable Wellbeing be an integral part of all secondary school teacher training along with specialist pedagogical content knowledge in one (or more) subject(s).
- Consideration for broadening the criteria for University Entrance to include, for instance, no fewer than 11 credits in each of four approved subject areas—a total of 44 credits compared to the current 42 over three approved subject areas.
- Consideration for supporting schools wishing to explore an SWM implementation with sufficient planning and preparation time for teachers and assistance with physical resourcing. Sustained adequate state support for pioneering initiatives will be vital at this early proof-of-concept stage. When enough school communities are involved, I have argued, Aotearoa New Zealand society as a whole will reach a system-wide tipping point at which transformation to a stable Education for Sustainable Wellbeing state will become self-sustaining.

However, even should such a political consensus and support for some form of Sustainable Wellbeing Metacurriulum fail to materialise at a national level, or until it does, there is nothing in the existing NZC or NCEA preventing schools and communities in Aotearoa New Zealand from undertaking their

own journey toward Sustainable Wellbeing education and thereby, I argue, best prepare their students and communities to optimise their chances of surviving and thriving in the Anthropocene.

### 7.8.2 Practice

If you are a New Zealand secondary school leader, or classroom teacher wanting to move towards education centred on Sustainable Wellbeing, how might you proceed in light of the current political polarisation and unresolved questions around curriculum priorities?

Based on my work with the teachers who participated in this study, and on my years of experience as a secondary school teacher in this country I suggest that you:

- Don't hesitate. Find the courage to exercise the agency afforded by the current curriculum, search for willing allies, and act according to your values and convictions. Individual teachers working within traditional subject-based departmental structures can in the first instance reach out to colleagues in other departments and to school leaders with proposals for Cross-Curricular Holistic courses in Sustainable Wellbeing including suggestions for any innovative timetable and other whole-school changes that might be required. If willing allies cannot be found where you are, look for work in a school which is already exploring education that centres Sustainable Wellbeing.
- Don't waste time anticipating impediments that the 'refreshed' Te Mātaiaho may or may not raise to a Sustainable Wellbeing Metacurriculum, when/If it becomes the new legal New Zealand Curriculum (NZC). Those constraints can be addressed most effectively when they arise.
- Gauge the strength of your convictions against your environmental and political vulnerabilities. Be prepared to reach out to your local communities, and other like-minded neighbouring schools, and take calculated risks if necessary to build the momentum of transformation. Collective action is best.
- Adopt high-level statements about the purposes of education—in addition to those already in the NZC—as school principles. You could even consider the option provided by the current coalition government of becoming a charter school with Sustainable Wellbeing as the founding principle of your charter.
- Study the examples of other schools that have demonstrated the power of determined enough leadership to achieve meaningful change. Sections 5.3.11 and C-3.11 for instance, describe Brent's experience of the process his school went through with teaching staff, their community, and resourcing, to establish its Innovation Stream Curriculum for years 9 and 10.
- Consider that the ideal of multipartite unity around the Sustainable Wellbeing imperative may ultimately prove to be unattainable at the global or even national level. The implications of these possible futures should be examined with senior students in the "Power and Influence" subdomain of the SWM. The SWM is intended to be an education that maximises our students' and their descendants' chances of surviving and thriving through the Anthropocene, regardless of the extent to which global civilization evolves, or regresses.

## 7.8.3 Further Research

### *7.8.3.1 A Sustainable Wellbeing Metacurriculum Framework Online Database*

My first recommendation for further research is that a publicly accessible database be set up to gather, collate and analyse teaching Units, courses, and programmes defined by their authors using the SWM framework, as an ongoing extension of the third Delphi Survey round of this Study. The database would need to be under the auspices of and curated by a university research organisation or existing teachers' association. Teachers and educators could both contribute to and mine the database for course design inspiration, resources, and research data.

The initial priority objectives of this 'SWM Database' project would be to;

- extend the Human-Societal level of the SWM framework to include teaching Units anchored in the Cultural Vision and Social Justice Subdomains, and linked to the NZC learning areas of the Arts, Languages, English and Mathematics;
- to investigate the nature of SWM Units/Courses created for students of different ages from years 9 to 13 to better describe conceptual and content progressions for these year levels; and
- determine the proportion of Units/courses being taught through a Cross-Curricular Holistic teaching team pedagogy relative to those taught within a Subject-Based Specialist solo teacher pedagogy.

The SWM database might also be extended to include teachers' observations of how their courses support the Self-integration of particular students, through their action, affective, and cognitive competencies development, at the Individual-Interpersonal level of the metacurriculum.

The possibility that the subdomains of the Human-Societal level of the SWM framework might be usefully extended to a third level of self-similar Sub-subdomains could be investigated. For instance, a local community Sustainable Wellbeing (SW) issue involving the Social Justice Subdomain of 'Equity, Rights and Responsibilities' might be elaborated to systematically consider civil rights/responsibilities, political-social rights/responsibilities, and environmental rights/responsibilities. Granados-Sánchez (2023) sees four categories here where the SWM framework might take the differentiation of political from social rights to a fifth framework level.

> The first set of rights achieved were civil rights, including the right to freedom of expression and the right to free association. Political rights came after and, thanks to them, most citizens in many countries obtained the right to vote. Later social rights linked to the welfare state were won and, finally, environmental rights are recognised today in many countries.
>
> (p. 12)

### *7.8.3.2 Collaborative Research Case Studies*

A logical next step in further developing the framework could be a single whole school case study or school case studies, using in-person focus groups or workshops with staff intending to trial a local version of a Sustainable Wellbeing Metacurriculum for or an SWM stream or within their school. This study would include teachers working with researchers to develop their own complementary CCH and SBS courses and SW Goals based on the SWM framework subdomain descriptors co-constructed in the present study. A whole-school approach would be taken and the key research objective would be

to understand the suite of courses and the programme developed by the teachers as an emergent, coherent, complex adaptive system. Other research objectives of the case study could include:

- Observe and facilitate the co-construction of Courses/Teaching Units by cross-curricular teaching teams for the CCH mode based on the SWM framework subdomain descriptors.
- Observe and facilitate the adaptation of SBS mode courses (teaching Units) to the extent that teachers decide they can be adapted to support the CCH mode Courses/Teaching Units.
- Observe the balance between CCH and SBS modes in a bimodal timetable that schools find works best for them.
- Observe how explicit mutually supportive links are established between CCH and SBS mode Courses/Teaching Units.
- Consider the progression of SWM Courses/Teaching Units from years 9 through 13 and the possible career-oriented domain 'specialisation' needs of students.
- Develop the individual/Interpersonal level of the metacurriculum through action research partnerships with teachers and specific students, following the students' Self-integration journey, through their action, affective, and cognitive competencies development in the context of their SWM, CCH and SBS Courses/Teaching Units.
- Observe how the emergence of an SWM in the school is supported by a whole-school approach to Sustainable Wellbeing including, campus and local environment, teacher, student and community relationships, and the school's cultural evolution.

#### *7.8.3.3 Challenges for Research*

My final recommendation for future research is the most important. Ways must be found to engage the interest and involvement of particular groups who were under-represented in this study—Specifically, non-European/Pākehā and especially Māori educators; male students; and teachers of the Arts, Languages, English and Mathematics. If a Sustainable Wellbeing Metacurriculum is to make a difference in the futures of Aotearoa New Zealand secondary school students, it must be radically inclusive and persuade a widely representative majority of students and educators that their sustainable wellbeing aligns with that of the Metacurriculum.

# References


Agbedahin, A. V., & Lotz-Sisitka, H. (2019). Mainstreaming education for sustainable development: Elaborating the role of position-practice systems using seven laminations of scale. *Journal of Critical Realism*, *18*(2), 103–122. https://doi.org/10.1080/14767430.2019.1602975

Albany Senior High School. (2021). *Timetable-School Day*. https://www.ashs.school.nz/timetable-school-day/

Alhadeff-Jones, M. (2008). Three Generations of Complexity Theories: Nuances and ambiguities. In M. Mason (Ed.), *Complexity theory and the philosophy of education*. Wiley-Blackwell.

Alison, J. (2008). The NCEA and How We Got There: The Role of PPTA in School Qualifications Reform 1980-2002. *New Zealand Journal of Teachers' Work*, *5*(2), 20.

Almond, R. E. A., Grooten, M., Juffe Bignoli, D., & Petersen, T. (Eds.). (2022). *WWF (2022) Living Planet Report 2022 – Building a nature-positive society*. CBS Library.

Ambrose, J. (2023, December 30). Climate scientists hail 2023 as 'beginning of the end' for fossil fuel era. *The Guardian*. https://www.theguardian.com/environment/2023/dec/30/climate-scientists-hail-2023-as-beginning-of-the-end-for-fossil-fuel-era

Amit, M., & Fried, M. N. (2005). Authority and Authority Relations in Mathematics Education: A View from an 8th Grade Classroom. *Educational Studies in Mathematics*, *58*(2), 145–168. https://doi.org/10.1007/s10649-005-3618-2

Anthony, A. (2021, January 2). Toil & Trouble. *NZ Listener*, 13–17.

Archer, M. S. (2020). The Morphogenetic Approach; Critical Realism's Explanatory Framework Approach. In P. Róna & L. Zsolnai (Eds.), *Agency and Causal Explanation in Economics* (Vol. 5, pp. 137–150). Springer International Publishing. https://doi.org/10.1007/978-3-030-26114-6_9

Archer, M. S., Bhaskar, R., Collier, A., Lawson, T., & Norrie, A. (1998). *Critical Realism: Essential Readings*. Taylor & Francis Group. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=1222857

Armstrong, C. M. J., Hustvedt, G., LeHew, M. L. A., Anderson, B. G., & Hiller Connell, K. Y. (2016). When the informal is the formal, the implicit is the explicit: Holistic sustainability education at Green Mountain College. *International Journal of Sustainability in Higher Education*, *17*(6), 756–775. https://doi.org/10.1108/IJSHE-02-2015-0012

Backman, E., Larneby, M., & Rudelius, R. (2024). (How) should environmental sustainability be a part of physical education? Analysing Swedish teachers' voices through a Bernsteinian perspective. *Sport, Education and Society*, 1–13. https://doi.org/10.1080/13573322.2024.2378120

Bailey, R., Bester, S., Dudu, W. T., Golightly, A., Havenga, M., Jagals, D., Laubscher, D., Le Grange, L., Mdakane, M., Mentz, E., Olivier, J., Petersen, N., Potgieter, E., Sebotsa, T., Speight Vaughn, M., van der Walt, M., van der Westhuizen, C., van Wyk, B.-E., & White, L. (2019). *The decolonisation of the curriculum project: The affordances of indigenous knowledge for self-directed learning* (J. de Beer, Ed.; Vol. 2). AOSIS. https://doi.org/10.4102/aosis.2019.BK133

Baland, J.-M., Bardhan, P., & Bowles, S. (2007). Introduction. In J.-M. Baland, P. Bardhan, & S. Bowles (Eds.), *Inequality, Cooperation, and Environmental Sustainability* (pp. 1–9). Princeton University Press; JSTOR. https://doi.org/10.2307/j.ctv301grk.4

Barad, K. (2007). *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Duke University Press. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=1169310

Barnett, R. (2013). Introduction to 'Imagining the University'. In *Imagining the University*. Routledge.

Beck, J. (2013). Powerful knowledge, esoteric knowledge, curriculum knowledge. *Cambridge Journal of Education*, *43*(2), 177–193. https://doi.org/10.1080/0305764X.2013.767880

Bell, A. (2024). *Becoming Tangata Tiriti: Working with Maori, Honouring the Treaty* (1st ed). Auckland University Press.

Bennett, J. (2010). *Vibrant Matter: A Political Ecology of Things*. Duke University Press. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=1170671

Berentson-Shaw, J. (2019). And the truth comes limping after: Communicating quality evidence in an age of misinformation. *Evaluation Matters—He Take Tō Te Aromatawai*, *5*, 19.

Berkes, F., Folke, C., & Gadgil, M. (1994). Traditional Ecological Knowledge, Biodiversity, Resilience and Sustainability. In C. A. Perrings, K.-G. Mäler, C. Folke, C. S. Holling, & B.-O. Jansson (Eds.), *Biodiversity Conservation: Problems and Policies. Papers from the Biodiversity Programme Beijer International Institute of Ecological Economics Royal Swedish Academy of Sciences* (pp. 269–287). Springer Netherlands. https://doi.org/10.1007/978-94-011-1006-8_15

Bernstein, B. (1975). *Class, codes, and control Vol III-Towards a Theory of Educational Transmission*. Routledge. http://public.eblib.com/choice/publicfullrecord.aspx?p=214480

Bettache, K. (2024). Where Is Capitalism? Unmasking Its Hidden Role in Psychology. *Personality and Social Psychology Review*, 10888683241287570. https://doi.org/10.1177/10888683241287570

Bhaskar, R. (2008a). *A Realist Theory of Science*. Routledge.

Bhaskar, R. (2008b). *Dialectic: The Pulse of Freedom*. Routledge. https://doi.org/10.4324/9780203892633

Bhaskar, R. (2013). *Reflections on Metareality* (2nd ed.). Routledge. https://doi.org/10.4324/9780203803103

Bhaskar, R. (2014). *The Possibility of Naturalism: A Philosophical Critique of the Contemporary Human Sciences*. Taylor & Francis Group. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=1744201

Bhaskar, R., Frank, C., Høyer, K. G., Naess, P., & Parker, J. (2010). *Interdisciplinarity and Climate Change: Transforming Knowledge and Practice for Our Global Future*. Taylor & Francis. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=481000

Biesta, G. (2014). Pragmatising the curriculum: Bringing knowledge back into the curriculum conversation, but via pragmatism. *The Curriculum Journal*, *25*(1), 29–49. https://doi.org/10.1080/09585176.2013.874954

Biesta, G. (2015). *Good Education in an Age of Measurement: Ethics, Politics, Democracy* (1st ed.). Routledge. https://doi.org/10.4324/9781315634319

Bird-David, N. (2022). How do we scale hunter-gatherers' social networks? In T. Widlok & M. D. Cruz (Eds.), *Scale Matters: The Quality of Quantity in Human Culture and Sociality* (1st ed., Vol. 263). transcript Verlag. https://doi.org/10.14361/9783839460993

Birdsall, S., & Glasgow, B. (2014). Creating a new pathway for learning using education for sustainability. *SET: Research Information for Teachers*, *2*.

Bloom, B. (1956). *Taxonomy of Educational Objectives*. Longmans.

Bloom, J. W. (2016). Chapter 3: A Batesonian Perspective on Qualitative Research and Complex Human Systems. In M. Koopmans & D. Stamovlasis (Eds.), *Complex dynamical systems in education: Concepts, methods and applications*. Springer.

Boix-Mansilla, Veronica., & Dawes-Duraising, E. (2007). Targeted Assessment of Students' Interdisciplinary Work: An Empirically Grounded Framework Proposed. *The Journal of Higher Education*, *78*(2), 215–237. https://doi.org/10.1353/jhe.2007.0008

Bolstad, R. (2011). *Taking a 'future focus' in education-what does it mean?* New Zealand Council for Educational Research.

Bolstad, R. (2020). *Climate change and sustainability in secondary schools: Findings from a 2020 survey of English-medium secondary and composite schools*. NZCER. https://doi.org/10.18296/rep.0010

Bolstad, R. (2023, August 7). *Responsibilities, expectations, and learning: What do Boards of Trustees need to know about climate transitions? | New Zealand Council for Educational Research*. https://www-nzcer-org-nz.ezproxy.waikato.ac.nz/blogs/responsibilities-expectations-and-learning-what-do-boards-trustees-need-know-about-climate

Bolstad, R., Gilbert, J., McDowall, S., Bull, A., Boyd, S., & Hipkins, R. (2012). *Supporting future-oriented learning & teaching—A New Zealand perspective*. Ministry of Education, New Zealand.

Bolstad, R., Joyce, C., & Hipkins, R. (2015). *Environmental education in New Zealand schools: Research update 2015*. Wellington: Ministry of Education. https://www.nzcer.org.nz/system/files/EE%20Update%20Report%20Final%202015_1.pdf

Bolstad, R., & Overbye, S. (2022). *Climate justice: What is it and why does it matter?* (Research Briefing 5; Education for a Changing Climate: What Are the Options?). NZCER.

Bourguignon, F., & Morrisson, C. (2002). Inequality Among World Citizens: 1820–1992. *American Economic Review*, *92*(4), 727–744. https://doi.org/10.1257/00028280260344443

Boyd, S. (2013). Student inquiry and curriculum integration: Ways of learning for the 21st century?(Part B). *New Zealand Council for Educational Research*, *1*.

Boyd, S., & Hipkins, R. (2012). Student inquiry and curriculum integration: Shared origins and points of difference? (Part A). *New Zealand Council for Educational Research*, *3*.

Bright, R., & Eames, C. (2020). Climate strikes: Their value in engaging and educating secondary school students. *Set: Research Information for Teachers*, *3*, 4–11. https://doi.org/10.18296/set.0180

Brown, J., & Isaacs, D. (2005). *The World Café: Shaping Our Futures Through Conversations That Matter*. Berrett-Koehler. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=483738

Brown, S. (2022, March 17). Measures of Shape: Skewness and Kurtosis. *BrownMath*. https://brownmath.com/stat/shape.htm

Bruster, D. (2003). The New Materialism in Early Modern Studies. In D. Bruster, *Shakespeare and the Question of Culture* (pp. 191–205). Palgrave Macmillan. https://doi.org/10.1007/978-1-137-05156-1_8

Bruun, J. T., Allen, J. I., & Smyth, T. J. (2017). Heartbeat of the Southern Oscillation explains ENSO climatic resonances. *Journal of Geophysical Research: Oceans*, *122*(8), 6746–6772. https://doi.org/10.1002/2017JC012892

Byrne, D., & Callaghan, G. (2022). *Complexity Theory and the Social Sciences: The State of the Art* (2nd ed.). Routledge. https://doi.org/10.4324/9781003213574

Calvin, K., Dasgupta, D., Krinner, G., Mukherji, A., Thorne, P. W., Trisos, C., Romero, J., Aldunce, P., Barrett, K., Blanco, G., Cheung, W. W. L., Connors, S., Denton, F., Diongue-Niang, A., Dodman, D., Garschagen, M., Geden, O., Hayward, B., Jones, C., … Péan, C. (2023). *IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland.* (First). Intergovernmental Panel on Climate Change (IPCC). https://doi.org/10.59327/IPCC/AR6-9789291691647

Carrington, D. (2023, November 20). World facing 'hellish' 3C of climate heating, UN warns before Cop28. *The Guardian*. https://www.theguardian.com/environment/2023/nov/20/world-facing-hellish-3c-of-climate-heating-un-warns-before-cop28

Cartwright, W. (Ed. ), Adams, J., Bosselmann, K., Davis, P., Hertnon, S., Howell, R., Lawton, M., Peet, J., Reid, W., Salinger, J., Trerise, K., & Verity, R. (2009). *Strong sustainability for New Zealand: Principles and scenarios*. Nakedize.

Castaneda, C. (1991). *The Fire from Within* (Reprint edition). Washington Square Press.

Cato Institute. (2024, August). *About the Cato Institute*. Cato Institute. https://www.cato.org/about

Chancel, L. (2022). Global carbon inequality over 1990–2019. *Nature Sustainability*, *5*(11), 931–938. https://doi.org/10.1038/s41893-022-00955-z

Chancel, L., Alvaredo, F., Piketty, T., Saez, E., & Zucman, G. (2017). *World Inequality Report 2018: Executive Summary*. World Inequality Lab, 2017. https://wir2018.wid.world/files/download/wir2018-summary-english.pdf

Cheatham, J. (Director). (2022, February 17). *How K-12 Schools Can Take Action on Climate Change* [Video recording]. Zoom. https://www.gse.harvard.edu/news/22/02/askwith-education-forum-how-k-12-schools-can-take-action-climate-change

Choat, S. (2018). Science, Agency and Ontology: A Historical-Materialist Response to New Materialism. *Political Studies*, *66*(4), 1027–1042. https://doi.org/10.1177/0032321717731926

Christersson, M. (2015, February 21). *Interactive Lorenz Attractor*. Malin Christersson. https://www.malinc.se/m/Lorenz.php

Cian, H. (2021). Sashaying Across Party Lines: Evidence of and Arguments for the Use of Validity Evidence in Qualitative Education Research. *Review of Research in Education*, *45*(1), 253–290. https://doi.org/10.3102/0091732X20985079

Cilliers, P. (1998). *Complexity and Postmodernism: Understanding Complex Systems*. Taylor & Francis Group. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=165109

Clark, C. R., Heimlich, J. E., Ardoin, N. M., & Braus, J. (2020). Using a Delphi study to clarify the landscape and core outcomes in environmental education. *Environmental Education Research*, *26*(3), 381–399. https://doi.org/10.1080/13504622.2020.1727859

Clayton, S., & Karazsia, B. T. (2020). Development and validation of a measure of climate change anxiety. *Journal of Environmental Psychology*, *69*, 101434. https://doi.org/10.1016/j.jenvp.2020.101434

Climate Council of Australia. (2024, December). *Conversation Guide: How to Clean up Polluting Information, and Respond to Common Climate Myths*. Climate Council of Australia. https://track.mail.climatecouncil.org.au/r?p=abtouzllwxv3ytnwfmataz3ja2h32cfrhmfrofqoasnbingszfkvblzt4eel64p2eqmw6avae5cvztlgrvxenxavuk6uhbyucfir2ynjmsphrwrkrr33w7qpadf676o6es5alu6vks3hfjgzvzqzah26nzm3okmon5qqeywq5afrsr2hle77gat4wwu6pprgpufeufsby

gu7wshb6lvu4euvzuju5ftror6pqby4jrrd2fw7ogdyv3bv6ngt7lvihstr5dqw3w3iqeormmbfgr6nx2yadgzd37od7ndn4qeu4e7mz4jf4ht67gje6t34adviqdthdqzcakm7jo723n4a7gk6qnupyge24s6a

Cobo-Rendón, R., Pérez-Villalobos, M. V., Páez-Rovira, D., & Gracia-Leiva, M. (2020). A longitudinal study: Affective wellbeing, psychological wellbeing, self-efficacy and academic performance among first-year undergraduate students. *Scandinavian Journal of Psychology*, *61*(4), 518–526. https://doi.org/10.1111/sjop.12618

Cochran-Smith, M., Ell, F., Ludlow, L., Grudnoff, L., & Aitken, G. (2014). The Challenge and Promise of Complexity Theory for Teacher Education Research. *Teachers College Record*, 39.

Cohen, L., Manion, L., & Morrison, K. (2017). Validity and reliability. In *Research Methods in Education*. Taylor & Francis Group. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=5103697

Cosgriff, M., & Gillespie, L. (2011). *Assessment in senior outdoor education: A catalyst for change? 2*(5), 16.

Crewson, P. (2016). *Applied Statistics iBook*.

Cruz, M., Foster, J., Quillin, B., & Schellekens, P. (2015). *Global Monitoring Report 2015/2016: Development Goals in an Era of Demographic Change*. The World Bank. https://doi.org/10.1596/978-1-4648-0669-8

Dahlin, B. (2017). *Rudolf Steiner: The Relevance of Waldorf Education*. Springer International Publishing. https://doi.org/10.1007/978-3-319-58907-7

Dalkey, N., & Helmer, O. (1963). An Experimental Application of the DELPHI Method to the Use of Experts. *Management Science*, *9*(3), 458–467. https://doi.org/10.1287/mnsc.9.3.458

Danermark, B., Ekstrom, M., Jakobsen, L., Karlsson, J. Ch., & Bhaskar, Prof. R. (2001). *Explaining Society: An Introduction to Critical Realism in the Social Sciences*. Taylor & Francis. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=240636

Dasgupta, P. (2001). *Human Well-Being and the Natural Environment*. Oxford University Press. https://doi.org/10.1093/0199247889.001.0001

Davis, B., & Sumara, D. (2006). *Complexity and Education—Inquiries into Learning, Teaching, and Research*. Routledge.

Davis, B., & Sumara, D. (2009). Complexity as a theory of education. *Curriculum Inquiry*, *5*(2), 13.

Davis, B., & Sumara, D. (2010). If things were simple...: Complexity in education. *Complexity in Education*, 5.

De Meyer, K., Coren, E., McCaffrey, M., & Slean, C. (2021). Transforming the stories we tell about climate change: From 'issue' to 'action'. *Environmental Research Letters*, *16*(1), 015002. https://doi.org/10.1088/1748-9326/abcd5a

Delbecq, A. L., Ven, A. H. V. de, & Gustafson, D. H. (1975). The Delphi Technique. In *Group Techniques for Program Planning: A Guide to Nominal Groups and Delphi Process*. Scott Foresman Company.

Deng, Z. (2020). *Knowledge, Content, Curriculum and Didaktik: Beyond Social Realism*. Routledge.

Dewey, J. (1916). *Democracy and Education: An Introduction to the Philosophy of Education*. Columbia University Press.

Díaz, S., Settele, J., Brondízio, E., Ngo, H., & Guèze, M. (2019). *Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

Dinham, A. (2007). Raising expectations or dashing hopes?: Well-being and participation in disadvantaged areas. *Community Development Journal*, *42*(2), 181–193. https://doi.org/10.1093/cdj/bsi110

Doyle, J., Chan, S., & Hale, M. (2022). The Evolution of NZ Institutes of Technology and Polytechnics. In S. Chan & N. Huntington (Eds.), *Reshaping Vocational Education and Training in Aotearoa New Zealand* (Vol. 34, pp. 39–56). Springer International Publishing. https://doi.org/10.1007/978-3-031-12168-5_3

Drake, D. S. M. (2007). *Creating Standards-Based Integrated Curriculum (text only) 2nd(Second) edition by Dr. S. M. Drake* (2nd edition). Corwin Press.

Dresner, S. (2003). The Principles of Sustainability. *International Journal of Sustainability in Higher Education*, *4*(3). https://doi.org/10.1108/ijshe.2003.24904cae.003

Dudgeon, P., Derry, K. L., Mascall, C., & Ryder, A. (2022). Understanding Aboriginal Models of Selfhood: The National Empowerment Project's Cultural, Social, and Emotional Wellbeing Program in Western Australia. *International Journal of Environmental Research and Public Health*, *19*(7), 4078. https://doi.org/10.3390/ijerph19074078

Durie, M. (2009). Maori Knowledge and Medical Science. In M. Incayawar, R. Wintrob, & L. Bouchard (Eds.), *Psychiatrists and Traditional Healers* (pp. 237–249). John Wiley & Sons, Ltd. https://doi.org/10.1002/9780470741054.ch19

Eames, C., Barker, M., & Scarff, C. (2018). Priorities, identity and the environment: Negotiating the early teenage years. *The Journal of Environmental Education*, *49*(3), 189–206. https://doi.org/10.1080/00958964.2017.1415195

Eames, C., Barker, M., Wilson-Hill, F., & Law, B. (2010). *Investigating the relationship between whole-school approaches to education for sustainability and student learning. A summary* (p. 6). Teaching and Learning Research Initiative (TLRI).

Eames, C., & Birdsall, S. (2019). Teachers' perceptions of a co-constructed tool to enhance their pedagogical content knowledge in environmental education. *Environmental Education Research*, *25*(10), 1438–1453. https://doi.org/10.1080/13504622.2019.1645445

Eames, C., & Bolstad, R. (2023, April 2). Education for a climate-changing, low-emissions Aotearoa New Zealand. *Ipu Kererū*. https://nzareblog.wordpress.com/2023/04/03/climate-change/

Eames, C., & Mardon, H. (2020). Part 2 Chapter 4 The Enviroschools Programme in Aotearoa New Zealand: Action-Orientated, Culturally Responsive, Holistic Learning. In A. Gough, J. C.-K. Lee, & E. P. K. Tsang (Eds.), *Green Schools Globally: Stories of Impact on Education for Sustainable Development*. Springer International Publishing. https://doi.org/10.1007/978-3-030-46820-0

Eames, C., Roberts, J., Cooper, G., & Hipkins, R. (2010, October). *Education for Sustainability in New Zealand Schools: An evaluation of three professional development programmes: Summary Report*.

Eames, C., Wilson-Hill, F., & Barker, M. (2013). Exploring whole-school approaches to education for sustainability. *Teaching and Learning*, 8.

Education Counts. (2023). *School leavers with NCEA Level 3 or above—2021*. NZ Ministry of Education Te Tāhuhu o te Mātauranga. https://www.educationcounts.govt.nz/statistics/school-leavers

Edwards, C., & Imrie, R. (2008). Disability and the Implications of the Wellbeing Agenda: Some Reflections from the United Kingdom. *Journal of Social Policy*, *37*(3), 337–355. https://doi.org/10.1017/S0047279408001943

Ehrbar, H. (2007). 11. The Relation between Marxism and Critical Realism. In J. Frauley & F. Pearce (Eds.), *Critical Realism & the Social Sciences*. University of Toronto Press. https://doi.org/10.3138/9781442684232-014

Eilam, E. (2022). Climate change education: The problem with walking away from disciplines. *Studies in Science Education*, 1–34. https://doi.org/10.1080/03057267.2021.2011589

Enviroschools. (2019, April 8). *Enviroschools-Processes and Supporting Resources*. Enviroschools. https://enviroschools.org.nz/about-us/resources/

Erikson, R. (1993). Descriptions of Inequality: The Swedish Approach to Welfare Research. In M. C. Nussbaum & A. Sen (Eds.), *The Quality of Life* (pp. 67–83). Oxford University Press. https://doi.org/10.1093/0198287976.003.0006

Ettekal, A., & Mahoney, J. L. (2017). Ecological Systems Theory. In K. Peppler (Ed.), *The SAGE Encyclopedia of Out-of-School Learning*. SAGE Publications, Inc. https://doi.org/10.4135/9781483385198

Everth, T., & Bright, R. (2022). Climate change and the assemblages of school leaderships. *Australian Journal of Environmental Education*, 1–20. https://doi.org/10.1017/aee.2022.8

Everth, T., Bright, R., Morey, C., dePetris, T., Gaze, S., Barker, A., Soanes, A., Gurney, L., & Eames, C. (2021a). Building capacity for climate-change education in Aotearoa New Zealand schools. *Set: Research Information for Teachers*, *2*, 34–39. https://doi.org/10.18296/set.0202

Everth, T., Bright, R., Morey, C., dePetris, T., Gaze, S., Barker, A., Soanes, A., Gurney, L., & Eames, C. (2021b). *Manuscript: Building capacity for climate change education in Aotearoa New Zealand schools*.

Eyre, J., & Hipkins, R. (2019). *Subject choice for the future of work: Insights from focus groups*. NZCER Press.

Eyre, J., & Watson, S. (2021). *It's time: Transformational timetabling practices*. New Zealand Council for Educational Research.

Fadel, C., & Groff, J. S. (2019). Four-Dimensional Education for Sustainable Societies. In J. W. Cook (Ed.), *Sustainability, Human Well-Being, and the Future of Education*. Springer International Publishing. https://doi.org/10.1007/978-3-319-78580-6

Feldman, D. P. (2019). Strange Attractors. In *Chaos and Dynamical Systems* (Vol. 14, pp. 189–222). Princeton University Press; JSTOR. https://doi.org/10.2307/j.ctvc5pczn.12

Fox, N. J., & Alldred, P. (2018). New Materialism. In P. A. Atkinson, S. Delamont, M. A. Hardy, & M. Williams (Eds.), *The SAGE Encyclopedia of Research Methods*. Sage.

Gasper, D. (2007). Uncounted or illusory blessings? Competing responses to the Easterlin, Easterbrook and Schwartz paradoxes of well-being. *Journal of International Development*, *19*(4), 473–492. https://doi.org/10.1002/jid.1383

Giangrande, N., White, R. M., East, M., Jackson, R., Clarke, T., Saloff Coste, M., & Penha-Lopes, G. (2019). A Competency Framework to Assess and Activate Education for Sustainable Development: Addressing the UN Sustainable Development Goals 4.7 Challenge. *Sustainability*, *11*(10), 2832. https://doi.org/10.3390/su11102832

Gilbert, J. (2015). Leading in collaborative, complex education systems. In *Leadership for Communities of Learning: Five Think Pieces* (p. 32). Education Council New Zealand.

Gilbert, J. (2019). Is Complexity Thinking a Useful Frame for Change-Oriented Educational Research? In V. Reyes, J. Charteris, A. Nye, & S. Mavropoulou (Eds.), *Educational Research in the Age of Anthropocene:* IGI Global. https://doi.org/10.4018/978-1-5225-5317-5

Gilead, T., & Dishon, G. (2022). Rethinking future uncertainty in the shadow of COVID 19: Education, change, complexity and adaptability. *Educational Philosophy and Theory*, *54*(6), 822–833. https://doi.org/10.1080/00131857.2021.1920395

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory; strategies for qualitative research*. Aldine Pub. Co.

Glass, J., McMorran, R., Currie, M., McKee, A., Pinker, A., Reed, M., Meador, E., & Markantoni, M. (2022). Translating community resilience theory into practice: A deliberative Delphi approach. *Sociologia Ruralis*, *62*(4), 675–698. https://doi.org/10.1111/soru.12397

Gough, A., Lee, J. C.-K., & Tsang, E. P. K. (Eds.). (2020). *Green Schools Globally: Stories of Impact on Education for Sustainable Development*. Springer International Publishing. https://doi.org/10.1007/978-3-030-46820-0

Granados-Sánchez, J. (2023). Sustainable Global Citizenship: A Critical Realist Approach. *Social Sciences*, *12*(3), 171. https://doi.org/10.3390/socsci12030171

Gurven, M., & Kaplan, H. (2007). Longevity Among Hunter- Gatherers: A Cross-Cultural Examination. *Population and Development Review*, *33*(2), 321–365. https://doi.org/10.1111/j.1728-4457.2007.00171.x

Hackerott, C. (2021). *An Interdisciplinary Approach to Undergraduate Climate Change Course Development*. *12*(6), 11.

Haggis, T. (2008). 'Knowledge Must Be Contextual': Some possible implications of complexity and dynamic systems theories for educational research. In M. Mason (Ed.), *Complexity theory and the philosophy of education*. Wiley-Blackwell.

Harari, Y. N. (2011). *Sapiens: A Brief History of Humankind*. Vintage.

Haraway, D. (2015). Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin. *Environmental Humanities*, *6*(1), 159–165. https://doi.org/10.1215/22011919-3615934

Harré, M. S., & Prokopenko, M. (2016). The social brain: Scale-invariant layering of Erdős–Rényi networks in small-scale human societies. *Journal of The Royal Society Interface*, *13*(118), 20160044. https://doi.org/10.1098/rsif.2016.0044

Hart, P. (2024). Exploring Complexities of Political Ecology in the Research and Practice of Environmental Education. *Australian Journal of Environmental Education*, 1–27. https://doi.org/10.1017/aee.2024.38

Harvey, F., Carrington, D., Watts, J., & Greenfield, P. (2019, October 14). How do we rein in the fossil fuel industry? Here are eight ideas. *The Guardian*. https://www.theguardian.com/environment/2019/oct/14/how-rein-in-fossil-fuel-industry-eight-ideas

Hattie, J. A. C. (2003). Teachers Make a Difference, What is the research evidence? *Building Teacher Quality: What Does the Research Tell Us*, 18. http://research.acer.edu.au/research_conference_2003/4/

Hattie, J. A. C., & Donoghue, G. M. (2016). Learning strategies: A synthesis and conceptual model. *Npj Science of Learning*, *1*(1). https://doi.org/10.1038/npjscilearn.2016.13

Heaton, S. (2018). The juxtaposition of Māori words with English concepts. 'Hauora, Well-being' as philosophy. *Educational Philosophy and Theory*, *50*(5), 460–468. https://doi.org/10.1080/00131857.2016.1167583

Hepburn, C., Adlen, E., Beddington, J., Carter, E. A., Fuss, S., Mac Dowell, N., Minx, J. C., Smith, P., & Williams, C. K. (2019). The technological and economic prospects for CO2 utilization and removal. *Nature*, *575*(7781), 87–97. https://doi.org/10.1038/s41586-019-1681-6

Heron, J. (1996). 2 Research Method and Participation. In *Co-Operative Inquiry: Research into the Human Condition*. SAGE Publications, Limited. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=483383

Hetherington, L. (2013). Complexity Thinking and Methodology: The Potential of 'Complex Case Study' for Educational Research. *Complicity: An International Journal of Complexity and Education*, *10*(1/2). https://doi.org/10.29173/cmplct20401

Heylighen, F., Cilliers, P., & Gershenson, C. (2006). *Complexity and Philosophy*. Ithaca: Cornell University Library, arXiv.org. https://doi.org/10.48550/arxiv.0604072

Hickel, J. (2019). The contradiction of the sustainable development goals: Growth versus ecology on a finite planet. *Sustainable Development*, sd.1947. https://doi.org/10.1002/sd.1947

Hill, A. (2012). Developing approaches to outdoor education that promote sustainability education. *Journal of Outdoor and Environmental Education*, *16*(1), 15–27. https://doi.org/10.1007/BF03400935

Hipkins, R. (2007). *Course innovation in the senior secondary curriculum*. NZCER.

Hipkins, R. (2021). *Teaching for Complex Systems Thinking*. NZCER Press. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=6970742

Hipkins, R. (2022, August 29). Supporting teachers to navigate uncertainties in rapidly changing times. *Ipu Kererū*. https://nzareblog.wordpress.com/2022/08/30/complexity-3/

Hipkins, R., Johnston, M., & Sheehan, M. (2016). *NCEA in Context*. New Zealand Council for Educational Research.

Hipkins, R., & Spiller, L. (2012). *NCEA and Curriculum Innovation: Learning from change in three schools*. NZCER.

Hipkins, R., Tolbert, S., Cowie, B., & Waiti, P. (2022). Enduring competencies for designing science learning pathways. *New Zealand Council for Educational Research*.

Hipkins, R., & Vaughan, K. (2019). *Subject choice for the future of work: Insights from research literature*. NZCER Press.

Hoadley, U., Sehgal-Cuthbert, A., Barrett, B., & Morgan, J. (2019). After the knowledge turn? Politics and pedagogy. *The Curriculum Journal*, *30*(2), 99–104. https://doi.org/10.1080/09585176.2019.1601844

Huckle, J. (2014). Education for Sustainability: Assessing Pathways to the Future. *Australian Journal of Environmental Education*, *30*(1), 31–50. https://doi.org/10.1017/aee.2014.21

Hughes, J. (2021). The Deskilling of Teaching and the Case for Intelligent Tutoring Systems. *Journal of Ethics and Emerging Technologies*, *31*(2). https://doi.org/10.3390/10.55613/jeet.v31i2.90

Hunter, J., Hunter, R., & Anthony, G. (2020). Shifting towards equity: Challenging teacher views about student capability in mathematics. *Mathematics Education Research Journal*, *32*(1), 37–55. https://doi.org/10.1007/s13394-019-00293-y

Isaacs, G. (1996). *Bloom's taxonomy of educational objectives*. The University of Queensland.

Jacobson, M. Z. (2022). 14. Timeline and Policies Needed to Transition. In *No Miracles Needed: How Today's Technology Can Save Our Climate and Clean Our Air* (1st ed.). Cambridge University Press. https://doi.org/10.1017/9781009249553

Jensen, B. B., & Schnack, K. (1997). The Action Competence Approach in Environmental Education. *Environmental Education Research*, *3*(2), 163–178. https://doi.org/10.1080/1350462970030205

Johnston, M. (2016, September 20). *What kinds of knowledge will serve our students best?'*. https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11714006

Johnston, M. (with Paviour-Smith, F. N.). (2022). *No Evidence, No Evaluation, No Exit*. The New Zealand Initiative.

Juhl, J., Routledge, C., Hicks, J. A., & Sedikides, C. (2017). Can Affectively Negative Experiences Contribute to Well-Being? The Affectively Negative Need-Fulfillment Model. In M. D. Robinson & M. Eid (Eds.), *The Happy Mind: Cognitive Contributions to Well-Being* (pp. 389–407). Springer International Publishing. https://doi.org/10.1007/978-3-319-58763-9_21

Kaukko, M., Kemmis, S., Heikkinen, H. L. T., Kiilakoski, T., & Haswell, N. (2021). Learning to survive amidst nested crises: Can the coronavirus pandemic help us change educational practices to prepare for the impending eco-crisis? *Environmental Education Research*, *27*(11), 1559–1573. https://doi.org/10.1080/13504622.2021.1962809

Kedward, K., Ryan-Collins, J., & Chenet, H. (2023). Biodiversity loss and climate change interactions: Financial stability implications for central banks and financial supervisors. *Climate Policy*, *23*(6), 763–781. https://doi.org/10.1080/14693062.2022.2107475

Kenner, D. (2019). *Carbon Inequality: The Role of the Richest in Climate Change* (1st ed.). Routledge. https://doi.org/10.4324/9781351171328

Khalid, R., Landini, S., Valasai, G. D., Khalid, F., & Sandwell, P. (2023). Towards equitable and inclusive energy systems for remote off-grid communities: A socio-technical assessment of solar power for village Helario in Tharparkar, Pakistan. *Renewable and Sustainable Energy Transition*, *4*, 100067. https://doi.org/10.1016/j.rset.2023.100067

Koltko-Rivera, M. E. (2006). Rediscovering the Later Version of Maslow's Hierarchy of Needs: Self-Transcendence and Opportunities for Theory, Research, and Unification. *Review of General Psychology*, *10*(4), 302–317. https://doi.org/10.1037/1089-2680.10.4.302

Komatsu, H., & Rappleye, J. (2018). *Will SDG4 achieve environmental sustainability?* Center for Advance Studies in Global Education. https://doi.org/10.14507/casge4.2018

Koskela, I.-M., & Paloniemi, R. (2022). Learning and agency for sustainability transformations: Building on Bandura's theory of human agency. *Environmental Education Research*, 1–15. https://doi.org/10.1080/13504622.2022.2102153

Kuhn, L. (2008). Complexity and Educational Research: A critical reflection. In M. Mason (Ed.), *Complexity theory and the philosophy of education*. Wiley-Blackwell.

Kwak, S. G., & Kim, J. H. (2017). Central limit theorem: The cornerstone of modern statistics. *Korean Journal of Anesthesiology*, *70*(2), 144. https://doi.org/10.4097/kjae.2017.70.2.144

Lee, R. B. (2018). Hunter-Gatherers and Human Evolution: New Light on Old Debates. *Annual Review of Anthropology*, *47*(1), 513–531. https://doi.org/10.1146/annurev-anthro-102116-041448

Leicht, A., Heiss, J., & Byun, W. J. (2018). *Issues and trends in education for sustainable development*. United Nations Educational, Scientific and Cultural Organization.

Lenton, T. M., McKay, D. I. A., Loriani, S., Abrams, J. F., Lade, S. J., Donges, J. F., Milkoreit, M., Powell, T., Smith, S. R., Zimm, C., Buxton, J. E., Bailey, E., Laybourn, L., & Ghadiali, A. (2023). *The Global Tipping Points Report 2023*. University of Exeter.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.

Lipson, B. (2018). *Spoiled by Choice: How NCEA hampers education, and what it needs to succeed*. The New Zealand Initiative.

Lipson, B. (2020). *NEW ZEALAND'S EDUCATION DELUSION: How bad ideas ruined a once world-leading school system*.

Longino, H. E. (1990). *Science as Social Knowledge*. Princeton University Press; JSTOR. https://doi.org/10.2307/j.ctvx5wbfz

Lotz-Sisitka, H., & Price, L. (2016). 1 Why critical realism, environmental learning and social-ecological change? Introducing the book. In L. Price & H. Lotz-Sisitka (Eds.), *Critical Realism, Environmental Learning and Social-Ecological Change*. Routledge.

Lucarini, V., & Bódai, T. (2020). Global stability properties of the climate: Melancholia states, invariant measures, and phase transitions. *Nonlinearity*, *33*(9), R59–R92. https://doi.org/10.1088/1361-6544/ab86cc

Mandelbrot, B. B. (1982). *The Fractal Geometry of Nature* (2nd prt. edition). Times Books.

Mård, N., & Klausen, S. H. (2023a). 1 Introduction. In *Developing a Didactic Framework Across and Beyond School Subjects: Cross- and Transcurricular Teaching* (1st ed.). Routledge. https://doi.org/10.4324/9781003367260

Mård, N., & Klausen, S. H. (2023b). 2 Speaking and thinking about crosscurricular teachingTerms, concepts, and conceptions. In *Developing a Didactic Framework Across and Beyond School Subjects: Cross- and Transcurricular Teaching* (1st ed.). Routledge. https://doi.org/10.4324/9781003367260

Marks, N., Thompson, S., Eckersley, R., Jackson, T., & Kasser, T. (2006). *DEFRA Project 3b: Sustainable development and well-being: Relationships, challenges and policy implications*. 8.

Martin, R. (2020, August 26). *Government to pump $11.7m into privately-run Green School in Taranaki*. RNZ. https://www.rnz.co.nz/news/political/424501/government-to-pump-11-point-7m-into-privately-run-green-school-in-taranaki

Masson-Delmotte, V., Zhai, P., Pörtner, H.-O., Roberts, D., Skea, J., & Shukla, P. R. (Eds.). (2018). *Global warming of 1.5°C-Summary for Policymakers*. IPCC.

Matthewman, S., Morgan, J., Mulen, M., Hindle, R., & Johansson, M. (2017). Teaching literacy in a time of environmental crisis. *Set: Research Information for Teachers*, *3*, 26–31. https://doi.org/10.18296/set.0089

McCleod, S. (2013). *Maslow Hierarchy of Needs*. HCC Certificate in Counselling Skills. http://www.simplypsychology.org/maslow.html

McDowall, S., & Hipkins, R. (2019). *Curriculum integration: What is happening in New Zealand schools?* NZCER Press.

McLauchlan, D. (2024, January 15). *School daze: Sweeping changes planned for NZ's education system*. NZ Herald. https://www.nzherald.co.nz/the-listener/new-zealand/school-daze-sweeping-changes-planned-for-nzs-education-system/D4333B34ERGYVCZP5JFC5ZLQNE/

McPhail, G. (2018). Curriculum integration in the senior secondary school: A case study in a national assessment context. *Journal of Curriculum Studies*, *50*(1), 56–76. https://doi.org/10.1080/00220272.2017.1386234

McPhail, G., & Rata, E. (2016). Comparing Curriculum Types: 'Powerful Knowledge' and '21st Century Learning'. *New Zealand Journal of Educational Studies*, *51*(1), 53–68. https://doi.org/10.1007/s40841-015-0025-9

Mead, S. M. (2003). *Tikanga Māori: Living by Māori values*. Wellington, N.Z: Huia.

Michelsen, G., Adomßent, M., Martens, P., & von Hauff, M. (2016). Chapter 2 Sustainable Development – Background and Context. In H. Heinrichs, P. Martens, G. Michelsen, & A. Wiek (Eds.), *Sustainability Science*. Springer. https://doi.org/10.1007/978-94-017-7242-6

Milbank, J., & Pabst, A. (2015). The meta-crisis of secular capitalism. *International Review of Economics*, *62*(3), 197–212. https://doi.org/10.1007/s12232-015-0239-7

Moorfield, J. C. (2003, 2022). *Te Aka Māori Dictionary*. Te Aka Māori Dictionary. https://www.maoridictionary.co.nz/

Morey, C. (2008). *Integrated Curriculum, Mathematics and Standards Based Assessment in Secondary Education: Parts of the Solution* [Massey University]. https://mro.massey.ac.nz/items/b75ec1f5-ef7a-42c5-a61b-3425ae7ac47c

Morgan, J., Hordern, J., & Hoadley, U. (2019). On the politics and ambition of the 'turn': Unpacking the relations between Future 1 and Future 3. *The Curriculum Journal*, *30*(2), 105–124. https://doi.org/10.1080/09585176.2019.1575254

Morin, E. (2007). Restricted Complexity, General Complexity. In Carlos Gershenson, Diederik Aerts, & Bruce Edmonds (Eds.), *Worldviews, Science And Us: Philosophy And Complexity*. World Scientific Publishing Company. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=312283

Morris, M. (2017). Disciplinarity and Interdisciplinarity William Pinar's Complicated Conversation with Curriculum Studies. In M. A. Doll & W. F. Pinar (Eds.), *The reconceptualization of curriculum studies: A festschrift in honor of William F. Pinar*. Routledge, Taylor & Francis.

Morrison, K. (2008). Educational Philosophy and the Challenge of Complexity Theory. In M. Mason (Ed.), *Complexity theory and the philosophy of education*. Wiley-Blackwell.

Morrison, K. (2024, July 10). *Why carbon capture and storage is not the solution*. https://ieefa.org/resources/why-carbon-capture-and-storage-not-solution

Morrow, S. L. (2005). Quality and trustworthiness in qualitative research in counseling psychology. *Journal of Counseling Psychology*, *52*(2), 250–260. https://doi.org/10.1037/0022-0167.52.2.250

Muller, J., & Young, M. (2019). Knowledge, power and powerful knowledge re-visited. *The Curriculum Journal*, *30*(2), 196–214. https://doi.org/10.1080/09585176.2019.1570292

Muñoz-García, I. M., Alcántara-Manzanares, J., & Medina Quintana, S. (2022). Key Aspects of Adolescents' Environmental Attitudes with a View to Transformative Education. *Education Sciences*, *12*(9), 591. https://doi.org/10.3390/educsci12090591

Musson, R. (2024). *The Story of Triple WellBeing-Learning to take care of ourselves, each other and our planet*. thoughtboxeducation.com. https://bit.ly/triplewellbeingbook

Nagelhout, R. (2024, March 1). *A Global View of Education and Climate Change | Harvard Graduate School of Education*. Harvard Graduate School of Education-News. https://www.gse.harvard.edu/ideas/news/24/03/global-view-education-and-climate-change

Napal, M., Mendióroz-Lacambra, A. M., & Peñalva, A. (2020). Sustainability Teaching Tools in the Digital Age. *Sustainability*, *12*(8), 3366. https://doi.org/10.3390/su12083366

National Oceanic and Atmospheric Administration. (2024). *Technical Discussion | El Niño/Southern Oscillation (ENSO)*. National Centers for Environmental Information. https://www.ncei.noaa.gov/access/monitoring/enso/technical-discussion

Neal, J. W., & Neal, Z. P. (2013). Nested or Networked? Future Directions for Ecological Systems Theory. *Social Development*, n/a-n/a. https://doi.org/10.1111/sode.12018

New Zealand Qualification Authority. (2023a, June 8). *Secondary Statistics Consolidated Data Files for 2022*. corporateName=New Zealand Qualifications Authority (NZQA). https://www.nzqa.govt.nz/qualifications-standards/understanding-nzqf/secondary-school-and-ncea/secondary-school-statistics/data-files-for-2022/#heading2-4

New Zealand Qualification Authority. (2023b, June 8). *Standard-Attainment-Statistics-National-2022-20230403*. corporateName=New Zealand Qualifications Authority (NZQA). https://www.nzqa.govt.nz/qualifications-standards/understanding-nzqf/secondary-school-and-ncea/secondary-school-statistics/data-files-for-2022/#heading2-4

New Zealand Qualification Authority. (2024a, October 9). *University Entrance: NZQA*. https://www2.nzqa.govt.nz/ncea/understanding-secondary-quals/university-entrance/

New Zealand Qualification Authority. (2024b, November 6). *About NCEA*. https://www2.nzqa.govt.nz/ncea/about-ncea/

Nilsson, M. (2018). Mapping interactions between the sustainable development goals: Lessons learned and ways forward. *Sustainability Science*, 15.

Noll, H.-H. (1996). Social Indicators and Social Reporting: The International Experience. *Final Report*. Symposium on Measuring Wellbeing and Social Indicators, Ottawa.

Norberg, J. (2016). *Progress: Ten reasons to look forward to the future*. Oneworld Publications.

Nussbaum, M. C. (2000). *Women and human development: The capabilities approach*. Cambridge University Press.

Nussbaum, M. C. (2003). Capabilities as Fundamental Entitlements: Sen and Social Justice. *Feminist Economics*, *9*(2–3), 33–59. https://doi.org/10.1080/1354570022000077926

NZ Education Review Office. (2012). *The New Zealand curriculum principles foundations for curriculum decision-making.* Education Review Office. http://ero.govt.nz/content/download/176996/2959328/version/3/file/Curriculum+Principles+2012.pdf

NZ Education Review Office. (2018). *What drives learning in the senior-secondary school*.

NZ Ministry for the Environment. (2019). *New Zealand greenhouse gas inventory*. New Zealand Government. http://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/nz-greenhouse-gas-inventory-2019.pdf

NZ Ministry of Education. (2007). *The New Zealand curriculum*. Published for the Ministry of Education by Learning Media.

NZ Ministry of Education. (2015a). *Education for sustainability teaching and learning senior secondary guide 2015*. http://seniorsecondary.tki.org.nz/Social-sciences/Education-for-sustainability

NZ Ministry of Education. (2015b). *The New Zealand curriculum for English-medium teaching and learning in years 1-13*. https://edumedia-depot.gei.de/bitstream/handle/11163/4923/1016127952_2007_A.pdf?sequence=2

NZ Ministry of Education. (2020, February 14). *Howick College – The Innovation Stream*. https://nzcurriculum.tki.org.nz/Curriculum-resources/School-snapshots/Howick-College

NZ Ministry of Education. (2022a, May 17). *The Equity Index*. Education in New Zealand. https://www.education.govt.nz/our-work/changes-in-education/equity-index/

NZ Ministry of Education. (2022b, September). *Te Mātaiaho-The refreshed NZ Curriculum-draft for feedback*. tki.

NZ Ministry of Education. (2023a). *Review of Achievement Standards*. https://ncea.education.govt.nz/review-achievement-standards#planned-review-dates

NZ Ministry of Education. (2023b). *Seven planned changes to strengthen NCEA*. https://ncea.education.govt.nz/seven-planned-changes-strengthen-ncea

NZ Ministry of Education. (2023c, March 23). *Te Mātaiaho-Draft for testing, March 2023*. NZ Government. https://web.archive.org/web/20240508002304/https://curriculumrefresh.education.govt.nz/te-mataiaho

NZ Ministry of Education. (2024a). *Māori Schools Directory Dec 2024*. Education Counts. https://www.educationcounts.govt.nz/directories/maori-schools-directory

NZ Ministry of Education. (2024b, June). *All-Teachers-FTTE-2014-2023.xlsx*. NZ Ministry of Education. https://www.educationcounts.govt.nz/statistics/teacher-numbers#4

NZ Ministry of Education. (2024c, August). *Indicator-School-leaver-destinations-2023-v2.pdf*. NZ Ministry of Education. https://www.educationcounts.govt.nz/statistics/school-leavers

NZ Ministry of Education. (2024d, October). *Te Mātaiaho | English in the New Zealand curriculum years 0–6*. NZ Ministry of Education.

Offer, A. (2006). Economic Welfare Measurements and Human Well-being. In *The Economic Future in Historical Perspective*. British Academy.

Olssen, M. (2008). Foucault as Complexity Theorist: Overcoming the problems of classical philosophical analysis. In M. Mason (Ed.), *Complexity theory and the philosophy of education*. Wiley-Blackwell.

Organisation for Economic Co-operation and Development. (n.d.). *Transformational change for net zero*. OECD. Retrieved 21 August 2024, from https://www.oecd.org/en/topics/sub-issues/transformational-change-for-net-zero.html

Organisation for Economic Co-operation and Development. (2014). *How Was Life?: Global Well-being since 1820* (J. L. Van Zanden, J. Baten, M. Mira d'Ercole, A. Rijpma, & M. P. Timmer, Eds.). OECD. https://doi.org/10.1787/9789264214262-en

Organisation for Economic Co-operation and Development. (2019). *OECD Future of Education and Skills 2030: OECD Learning Compass 2030: A Series of Concept Notes*.

Osberg, D., Biesta, G., & Cilliers, P. (2008). From Representation to Emergence: Complexity's challenge to the epistemology of schooling. In M. Mason (Ed.), *Complexity theory and the philosophy of education*. Wiley-Blackwell.

Osborne, J., Collins, S., Ratcliffe, M., Millar, R., & Duschl, R. (2003). What ideas-about-science should be taught in school science? A Delphi study of the expert community. *Journal of Research in Science Teaching*, *40*(7), 692–720. https://doi.org/10.1002/tea.10105

O'Shaughnessy, E., Barbose, G., Kannan, S., & Sumner, J. (2024). Evaluating community solar as a measure to promote equitable clean energy access. *Nature Energy*. https://doi.org/10.1038/s41560-024-01546-2

O'Toole, V., Martin, R., Fickel, L., & Britt, E. (2019). Emotional wellbeing as perceived and understood through the lenses of SEL and PYD: A qualitative commentary and suggestions for future research in Aotearoa New Zealand. *New Zealand Journal of Psychology (Online)*, *48*(2), 91–102.

Our World in Data. (n.d.). *Life expectancy*. Our World in Data. Retrieved 15 August 2024, from https://ourworldindata.org/grapher/life-expectancy

Papa Taiao. (2021). *Tiaki Taiao Regenerative Enterprise Model of Learning-internal document*. Papa Taiao - Earthcare.

Phillips, D. (2006). *Quality of life: Concept, policy and practice*. Routledge, $c 2006.

Piketty, T. (2014). *Capital in the Twenty-First Century* (A. Goldhammer, Trans.). Belknap Harvard.

Pinar, W. F. (2012). *What is curriculum theory* (2nd ed). Routledge.

Pinar, W. F., Reynolds, W. M., Slattery, P., & Taubman, P. M. (1995). Chapter 5: Understanding Curriculum as Political Text. *Counterpoints*, *Vol. 17*.

Plevyak, L. H. (2022). *Teaching Towards Green Schools: Transforming K–12 Education through Sustainable Practices* (1st ed.). Routledge. https://doi.org/10.4324/9781003164524

Poletti, S., Mountain, B., & Bertram, G. (2024, August 20). *NZ's electricity market is a mess. Rolling out rooftop solar would change the game*. The Conversation.

http://theconversation.com/nzs-electricity-market-is-a-mess-rolling-out-rooftop-solar-would-change-the-game-236943

Pomeroy, D., Jones, K.-L., Azarmandi, M., & Tolbert, S. (2020, September 11). *Could academic streaming in New Zealand schools be on the way out? The evidence suggests it should be*. EducationHQ.

Prashad, V. (Ed. ), Klein, N., Ghosh, A., Andrade, C. D. de, Foster, J. B., Hage, G., Zakaria, R., Alatas, M., Singh, S., & Abulhawa, S. (2017). *Will the Flower Slip Through the Asphalt: Writers Respond to Capitalist Climate Change*. LeftWord Books.

Quiggin, D., Meyer, K. D., Hubble-Rose, L., & Froggatt, A. (2021). *Climate change risk assessment 2021* (p. 53). Chatham House, the Royal Institute of International Affairs.

Quinn, M. (Ed.). (2019). *Complexifying curriculum studies: Reflections on the generative and generous gifts of William E. Doll, Jr*. Routledge.

Rameka, L. (2015). Te Ira Atua: The spiritual spark of the child. *He Kupu: The Word*, *4*(2). https://www.hekupu.ac.nz/well-being-early-childhood-education

Randall, I. (2022, December 20). *Epoch or event? Defining the Anthropocene*. Physics World. https://physicsworld.com/epoch-or-event-defining-the-anthropocene/

Rantanen, M., Karpechko, A. Yu., Lipponen, A., Nordling, K., Hyvärinen, O., Ruosteenoja, K., Vihma, T., & Laaksonen, A. (2022). The Arctic has warmed nearly four times faster than the globe since 1979. *Communications Earth & Environment*, *3*(1), 168. https://doi.org/10.1038/s43247-022-00498-3

Rappleye, J., & Komatsu, H. (2020). Towards (comparative) educational research for a finite future. *Comparative Education*, *56*(2), 190–217. https://doi.org/10.1080/03050068.2020.1741197

Rata, E. (2021, February 16). *What we're teaching our children is ill-conceived*. Newsroom. https://www.newsroom.co.nz/ideasroom/page/what-were-teaching-our-kids-ill-conceived?utm_source=Friends+of+the+Newsroom&utm_campaign=634c333f1a-Week+In+Review+20.2.21&utm_medium=email&utm_term=0_71de5c4b35-634c333f1a-97928264

Rata, E., McPhail, G., & Barrett, B. (2019). An engaging pedagogy for an academic curriculum. *The Curriculum Journal*, *30*(2), 162–180. https://doi.org/10.1080/09585176.2018.1557535

Räthzel, N., & Uzzell, D. (2009). Transformative environmental education: A collective rehearsal for reality. *Environmental Education Research*, *15*(3), 263–277. https://doi.org/10.1080/13504620802567015

Reimers, F. M., & Chung, C. K. (2016). *Teaching and learning for the twenty-first century: Educational goals, policies, and curricula from six nations*.

Richardson, M. (2022, August 10). Biodiversity Stripes – A Journey from Green to Grey. *Finding Nature*. https://findingnature.org.uk/2022/08/10/biodiversity-stripes/

Richardson, M., Hamlin, I., Elliott, L. R., & White, M. P. (2022). Country-level factors in a failing relationship with nature: Nature connectedness as a key metric for a sustainable future. *Ambio*. https://doi.org/10.1007/s13280-022-01744-w

Ripple, W. J., Wolf, C., Newsome, T. M., Barnard, P., & Moomaw, W. R. (2019). World Scientists' Warning of a Climate Emergency. *BioScience*, biz088. https://doi.org/10.1093/biosci/biz088

Ripple, W. J., Wolf, C., Newsome, T. M., Galetti, M., Alamgir, M., Crist, E., Mahmoud, M. I., Laurance, W. F., & 15,364 scientist signatories from 184 countries. (2017). World Scientists' Warning to Humanity: A Second Notice. *BioScience*, *67*(12), 1026–1028. https://doi.org/10.1093/biosci/bix125

Ritchie, H., Rosado, P., & Roser, M. (2023, December 28). *$CO_2$ and Greenhouse Gas Emissions*. Our World in Data. https://ourworldindata.org/co2-and-greenhouse-gas-emissions

Ritchie, H., & Roser, M. (2017, May 11). *$CO_2$ and Greenhouse Gas Emissions*. Our World in Data. https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions

RNZ. (2021, April 7). *Christchurch 'climate action campus' a first-of-its-kind*. RNZ. https://www.rnz.co.nz/news/national/440007/christchurch-climate-action-campus-a-first-of-its-kind

RNZ. (2024, April 10). *European court rules human rights violated by climate inaction*. RNZ. https://www.rnz.co.nz/news/world/513879/european-court-rules-human-rights-violated-by-climate-inaction?utm_source=substack&utm_medium=email

Robbins, S., & van Wynsberghe, A. (2022). Our New Artificial Intelligence Infrastructure: Becoming Locked into an Unsustainable Future. *Sustainability*, *14*(8), 4829. https://doi.org/10.3390/su14084829

Rose, N. (1990). Governing the Enterprising Self. In P. Heelas & P. Morris (Eds.), *The Values of the Enterprise Culture: The Moral Debate* (p. 27). Unwin Hyman.

Rout, M., Spiller, C., Reid, J., Mika, J., & Haar, J. (2022). *Te Niho o te Taniwha: The teeth of the Taniwha. Exploring present-future pathways for whānau and hapū in Māori economies of wellbeing.* Ngā Pae o te Māramatanga.

Royal Commission of Inquiry. (2020). *Ko-to-tatou-kainga-tenei: Royal Commission of Inquiry into the terrorist attack on Christchurch masjidain on 15 March 2019*. https://christchurchattack.royalcommission.nz/the-report/download-report/download-the-report/

Rui, N. (2009). Four decades of research on the effects of detracking reform: Where do we stand?—A systematic review of the evidence. *Journal of Evidence-Based Medicine*, *2*(3), 164–183. https://doi.org/10.1111/j.1756-5391.2009.01032.x

Ryff, C. D. (2014). Psychological Well-Being Revisited: Advances in the Science and Practice of Eudaimonia. *Psychotherapy and Psychosomatics*, *83*(1), 10–28. https://doi.org/10.1159/000353263

Sachdeva, S. (2022, November 25). *Trade head: How to tackle the world's 'poly-crisis'*. Newsroom. https://www.newsroom.co.nz/page/trade-head-how-to-tackle-the-worlds-poly-crisis?utm_source=Friends+of+the+Newsroom&utm_campaign=3a7a376c20-Daily_Briefing+28.11.2022&utm_medium=email&utm_term=0_71de5c4b35-3a7a376c20-97928264

Sauvé, L. (2009). Being Here Together. In *Fields of green: Restorying culture, environment and education* (pp. 325–337). Hampon Press Inc.

Sayre, R., & Löwy, M. (2019). *Romantic Anti-capitalism and Nature: The Enchanted Garden* (1st ed.). Routledge. https://doi.org/10.4324/9780429293535

Schagen, D. S. (2011). *Implementation of the New Zealand Curriculum: Synthesis of Research & Evaluation*. Ministry of Education, New Zealand.

Schlanger, Z. (2024, September 3). America's New Climate Delusion. *The Atlantic*. https://www.theatlantic.com/science/archive/2024/09/louisiana-climate-carbon-capture-lng/679664/

Scott, K. (2012). *Measuring wellbeing: Towards sustainability?* Routledge.

Sen, A. (1993). Capability and Wellbeing. In M. C. Nussbaum & A. Sen (Eds.), *Capability and well-being. The quality of life*. Oxford University Press.

Seo, E., Ryu, J., & Hwang, S. (2020). Building key competencies into an environmental education curriculum using a modified Delphi approach in South Korea. *Environmental Education Research*, *26*(6), 890–914. https://doi.org/10.1080/13504622.2020.1733493

Sharma, P. K., Andreou, N., & Funder, A. C. D. (Eds.). (2019). *Changing Together. Eco-Schools 1994-2019*. Foundation for Environmental Education.

Shephard, K. (2020). *Higher Education for Sustainability—Seeking Intellectual Independence in Aotearoa New Zealand*. Springer. http://public.eblib.com/choice/PublicFullRecord.aspx?p=6005438

Shephard, K., Birdsall, S., Eames, C., & Ritchie, J. (2024). Environmental and Sustainability Education in Aotearoa New Zealand in the Context of the Sustainable Development Goals. In M. Rieckmann & R. T. Muñoz, *World Review: Environmental and Sustainability Education in the Context of the Sustainable Development Goals* (1st ed., pp. 318–337). CRC Press. https://doi.org/10.1201/9781003145202-24

Sjöblom, P., Wolff, L.-A., & Sundman, J. (2023). 14 Climate change as a socioscientific issue in upper secondary education Addressing wicked problems through crosscurricular approaches. In *Developing a Didactic Framework Across and Beyond School Subjects: Cross- and Transcurricular Teaching* (1st ed.). Routledge. https://doi.org/10.4324/9781003367260

Snow, K., & Obed, D. (2022). Toward 'Inummarik' (well-balanced humans): An investigation of the role of land-based learning programs in public education. *Polar Geography*, 1–15. https://doi.org/10.1080/1088937X.2022.2105971

Snowden, D. (2002). Complex acts of knowing: Paradox and descriptive self-awareness. *Journal of Knowledge Management*, *6*(2), 100–111. https://doi.org/10.1108/13673270210424639

Snowden, D. J., & Boone, M. E. (2007). Wise executives tailor their approach to fit the complexity of the circumstances they face. *Harvard Business Review*, 10.

Southey, K. M. (2020). *Re-presenting Māori and Indigenous understandings of Being: Deconstructing the notion of mental illness* [PhD]. Univerity of Waikato.

Spencer, H. (2009). *Essays on education and kindred subjects*. Floating Press.

Stacey, M., Gavin, M., Fitzgerald, S., McGrath-Champ, S., & Wilson, R. (2024). Reducing teachers' workload or deskilling 'core' work? Analysis of a policy response to teacher workload demands. *Discourse: Studies in the Cultural Politics of Education*, *45*(2), 187–199. https://doi.org/10.1080/01596306.2023.2271856

Stanley, D., & Young, K. (2011). Conceptualizing Complexities of Curriculum. Developing a Lexicon for Ecojustice and the Transdisciplinarity of Bodies. *Journal of Curriculum Theorizing*, *27*(1), 12.

Stapp, W. B. (1969). The Concept of Environmental Education. *Environmental Education*, *1*(1), 30–31. https://doi.org/10.1080/00139254.1969.10801479

Steiner, R. (1907, June 21). *Theosophy and Rosicrucianism-VI. Man's Decent into an Earthly Incarnation*. The Rudolf Steiner Archive. https://rsarchive.org/Lectures/GA100/English/ANS1942/19070621p01.html

Steiner, R. (1919). *Study of Man. General Education Course.* (D. Harwood, H. Fox, & A. C. Harwood, Trans.; 1966th ed.). Rudolf Steiner Press.

Steiner, R. (1922). *The Threefold Commonwealth* (E. Bowen-Wedgewood, Trans.). Trieste Publishing Pty Ltd.

Sterling, S. (2016). A Commentary on Education and Sustainable Development Goals. *Journal of Education for Sustainable Development*, *10*(2), 208–213. https://doi.org/10.1177/0973408216661886

Stock, R. (2023, January 24). *Back-to-school costs, and the school where there are none*. Stuff. https://www.stuff.co.nz/business/money/131043817/backtoschool-costs-and-the-school-where-there-are-none

Strauss, A. L., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Sage Publications.

Thaker, J. (2019). Corporate communication about climate science: A comparative analysis of top corporations in New Zealand, Australia, and Global Fortune 500. *Journal of Communication Management*, *24*(3), 245–264. https://doi.org/10.1108/JCOM-06-2019-0092

Theise, N. D., & Kafatos, M. C. (2013). Complementarity in biological systems: A complexity view. *Complexity*, *18*(6), 11–20. https://doi.org/10.1002/cplx.21453

Thorburn, M. (2017). Dewey, democracy, and interdisciplinary learning: A Scottish perspective. *Oxford Review of Education*, *43*(2), 242–254. https://doi.org/10.1080/03054985.2017.1284657

Tilbury, D. (1995). Environmental Education for Sustainability: Defining the new focus of environmental education in the 1990s. *Environmental Education Research*, *1*(2), 195–212. https://doi.org/10.1080/1350462950010206

Torbert, W. (2021). New Social Science Paradigms for the 21st Century. *Academia Letters*. https://doi.org/10.20935/AL112

Trott, C. D. (2020). Children's constructive climate change engagement: Empowering awareness, agency, and action. *Environmental Education Research*, *26*(4), 532–554. https://doi.org/10.1080/13504622.2019.1675594

Tyler, R. W. (Ralph W. (1949). *Basic principles of curriculum and instruction*. Chicago : University of Chicago Press.

UNEP. (2023). *Emissions Gap Report 2023—Broken Record – Temperatures hit new highs, yet world fails to cut emissions (again)*. United Nations Environment Programme. https://doi.org/10.59117/20.500.11822/43922

UNESCO-UNEP. (1975). The Belgrade Charter. *Connect: UNESCO-UNEP Environmental Education Newsletter, 1 (1): 1–2.*, *1*(1), 1–2.

UNFCCC. (2023, November 14). *New Analysis of National Climate Plans: Insufficient Progress Made, COP28 Must Set Stage for Immediate Action*. https://unfccc.int/news/new-analysis-of-national-climate-plans-insufficient-progress-made-cop28-must-set-stage-for-immediate

United Nations. (2015). *Transforming Our World: The 2030 Agenda for Sustainable Development A/RES/70/1*. https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

United Nations General Assembly. (2005). *Resolution adopted by the General Assembly on 16 September 2005: A_RES_60_1*. https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_60_1.pdf

United Nations Sustainable Development Group. (2022, March 11). *UNSDG | The 5Ps of the SDGs: People, Planet, Prosperity, Peace and Partnership*. https://unsdg.un.org/latest/videos/5ps-sdgs-people-planet-prosperity-peace-and-partnership

University of Auckland. (2022, April 3). *Complex Conversations—Developing better approaches to public engagement around complex issues*. Complex Conversations. https://www.complexconversations.nz/#watercare-project

Valentine, H., Tassell-Mataamua, N., & Flett, R. (2017). Whakairia ki runga: The many dimensions of wairua. *New Zealand Journal of Psychology*, *46*(3), 8.

Valera, L., & Salazar, G. (2020). Challenging Sustainability: From Deconstruction to Reconstruction. *The Journal of Natural and Social Philosophy*, *16*(1), 19.

Veenhoven, R. (1996). Happy life-expectancy: A comprehensive measure of quality-of-life in nations. *Social Indicators Research*, *39*(1), 1–58. https://doi.org/10.1007/BF00300831

Verlie, B. (2019). Bearing worlds: Learning to live-with climate change. *Environmental Education Research*, *25*(5), 751–766. https://doi.org/10.1080/13504622.2019.1637823

Verlie, B. (2021). *Learning to Live with Climate Change: From Anxiety to Transformation* (1st ed.). Routledge. https://doi.org/10.4324/9780367441265

Verlie, B., & Flynn, A. (2022). School strike for climate: A reckoning for education. *Australian Journal of Environmental Education*, *38*(1), 1–12. https://doi.org/10.1017/aee.2022.5

Viana, M. (2000). What's new on Lorenz strange attractors? *The Mathematical Intelligencer*, *22*(3), 6–19. https://doi.org/10.1007/BF03025276

Vidal-Meliá, L., Estrada, M., Monferrer, D., & Rodríguez-Sánchez, A. (2022). Does Mindfulness Influence Academic Performance? The Role of Resilience in Education for Sustainable Development. *Sustainability*, *14*(7), 4251. https://doi.org/10.3390/su14074251

Waiti, P., & Hipkins, R. (2023, August 10). *What is a knowledge system?* Science Learning Hub. https://www.sciencelearn.org.nz/resources/3272-what-is-a-knowledge-system

Walker, C. (2020). Uneven solidarity: The school strikes for climate in global and intergenerational perspective. *Sustainable Earth*, *3*(1), 5. https://doi.org/10.1186/s42055-020-00024-3

Walker-Werth, T., & Walker-Werth, A. (2022). Johan Norberg on Openness, Innovation, and Flourishing. *The Objective Standard*, *17*(3).

Wamsler, C., & Bristow, J. (2022). At the intersection of mind and climate change: Integrating inner dimensions of climate change into policymaking and practice. *Climatic Change*, *173*(1–2), 7. https://doi.org/10.1007/s10584-022-03398-9

Wan, Y., & Bi, H. (2020). What Major "Socio-Scientific Topics" Should the Science Curriculum Focused on? A Delphi Study of the Expert Community in China. *International Journal of Science and Mathematics Education*, *18*(1), 61–77. https://doi.org/10.1007/s10763-018-09947-y

Wang, B., & Chen, T. (2022). Social Progress beyond GDP: A Principal Component Analysis (PCA) of GDP and Twelve Alternative Indicators. *Sustainability*, *14*(11), 6430. https://doi.org/10.3390/su14116430

WCED. (1987). *The Brundtland Report-Report of the World Commission on Environment and Development: Our Common Future* (A/42/427). The World Commission on Environment and Development; Oxford University Press. https://www.are.admin.ch/are/en/home/sustainable-development/international-cooperation/2030agenda/un-_-milestones-in-sustainable-development/1987--brundtland-report.html

Weaver, W. (1948). Science and Complexity. *American Scientist*, *36*(4), 449–456. https://doi.org/10.1007/978-1-4899-0718-9_30

Westra, R. (2019). Roy Bhaskar's Critical Realism and the Social Science of Marxian Economics. *Review of Radical Political Economics*, *51*(3), 365–382. https://doi.org/10.1177/0486613418787405

White, P. J., Ardoin, N. M., Eames, C., & Monroe, M. C. (2023). *Agency in the Anthropocene: Supporting document to the PISA 2025 Science Framework* (297; OECD Education Working Papers). https://doi.org/10.1787/8d3b6cfa-en

Wiatros-Motyka, M., Fulghum, N., & Jones, D. (2024). *Global Electricity Review 2024* (Annual Global Electricity Review 5). Ember. https://ember-climate.org/insights/research/global-electricity-review-2024/

Widlok, T., & Cruz, M. D. (Eds.). (2022). *Scale Matters: The Quality of Quantity in Human Culture and Sociality* (1st ed., Vol. 263). transcript Verlag. https://doi.org/10.14361/9783839460993

Wild, C. J., Horton, N., Pfunnkuch, M., & Regan, M. (2011, February 4). *Guidelines for 'How to make the call': Curriculum levels 5 to 7*. https://new.censusatschool.org.nz/wp-content/uploads/2012/09/Shifts-diagram.11.02.041.pdf

Wild, C. J., Pfannkuch, M., Regan, M., & Horton, N. J. (2011). Towards more accessible conceptions of statistical inference: Conceptions of Statistical Inference. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, *174*(2), 247–295. https://doi.org/10.1111/j.1467-985X.2010.00678.x

Wild, C. J., Pfannkuch, M., Regan, M., & Parsonage, R. (2017). Accessible Conceptions of Statistical Inference: Pulling Ourselves Up by the Bootstraps: Accessible Conceptions of Statistical Inference. *International Statistical Review*, *85*(1), 84–107. https://doi.org/10.1111/insr.12117

Wilhelm, R., & Baynes, C. F. (with Wilhelm, H., & Jung, C. G.). (1967). *The I Ching, or, Book of Changes* (3rd edition). Princeton University Press.

Wilkie, L., Fisher, Z., & Kemp, A. H. (2022). The Complex Construct of Wellbeing and the Role of Vagal Function. *Frontiers in Integrative Neuroscience*, *16*, 925664. https://doi.org/10.3389/fnint.2022.925664

Will, M. (2023, January 13). You Can Teach About Climate Change in Every Subject and Grade Level. Here's How. *Education Week*. https://www.edweek.org/teaching-learning/you-can-teach-about-climate-change-in-every-subject-and-grade-level-heres-how/2023/01

Williams, D. H. (2023). *A Critical Approach to Analyzing and Addressing Worldview-Based Cultural Conflict Between Indigenous Peoples and Western Science in Education and Research* [University of Kansas]. https://www.proquest.com/docview/2917731014?accountid=17287&fromopenview=true&parentSessionId=9d2SSawdO3GKuxEBhVo8A0BgJbe79hGA%2FMpAWzeYt60%3D&parentSessionId=AID%2B%2Foysv6kzmH%2Bvgmo7sjDbczL8g83%2FTDTmSBJhTK4%3D&pq-origsite=gscholar&sourcetype=Dissertations%20&%20Theses

Wills, J. (n.d.). *NZGrapher*. Retrieved 9 April 2023, from https://grapher.nz/

Wright, C., Nyberg, D., & Bowden, V. (2021). Beyond the discourse of denial: The reproduction of fossil fuel hegemony in Australia. *Energy Research & Social Science*, *77*, 102094. https://doi.org/10.1016/j.erss.2021.102094

Wypych, A., & Field, A. (2021). *Enviroschools Survey 2021:* Enviroschools.

Young, M. (2009). Education, globalisation and the 'voice of knowledge'. *Journal of Education and Work*, *22*(3), 193–204. https://doi.org/10.1080/13639080902957848

Young, M. (2013). Overcoming the crisis in curriculum theory: A knowledge-based approach. *Journal of Curriculum Studies*, *45*(2), 101–118. https://doi.org/10.1080/00220272.2013.764505

Young, M., & Muller, J. (2010). Three Educational Scenarios for the Future: Lessons from the sociology of knowledge. *European Journal of Education*, *45*(1), 11–27. https://doi.org/10.1111/j.1465-3435.2009.01413.x

Young, M., & Muller, J. (2016). *Curriculum and the specialisation of knowledge: Studies in the sociology of education*. Routledge.

Zaiontz, C. (n.d.). *Fisher Exact Test | Real Statistics Using Excel*. Retrieved 25 April 2024, from https://real-statistics.com/chi-square-and-f-distributions/fishers-exact-test/

Zamorano Llena, C., Stier, J., & Gray, B. (2023). The future of (meta)crisis: From anxiety and the culture of fear to hope, solidarity, and the culture of resilience? In *Crisis and the Culture of Fear and Anxiety in Contemporary Europe* (1st ed.). Routledge. https://doi.org/10.4324/9781003290254

Zanden, G.-J. V. der, & Henzen, R. (2024). *Transforming our critical systems: How can we achieve the systemic change the world needs?* Cambridge University Press.

# Appendices

## Appendix A for Chapter 3: Methodology

### A-1 Participant Recruitment

#### *A-1.1 Enviroschools Invitation Covering Email*

subject: Toward a Sustainable Wellbeing centred Metacurriculum for New Zealand Secondary Schools

Dear [FirstName],

I have been given your name and email address by Anke Nieschmidt at Enviroschools, as an educator who could be interested in being involved as a Delphi survey panellist in my PhD research project at the University of Waikato, toward a Sustainable Wellbeing centred Metacurriculum for New Zealand Secondary Schools.

My project is based on two premises:

- that within the next 10 to 20 years humanity must radically transition from a world of nations founded on environmentally, socially, and culturally exploitative GDP growth to a global civilization prioritizing sustainable wellbeing; and
- that education at all levels and for all people, has an integral and vital role to play in this transition.

The research will explore what would enable New Zealand secondary schools to establish a curriculum centred on Sustainable Wellbeing for their students and locality. It will focus particularly on the development of a curriculum framework for students in years 11 to 13, linked to related collections of National Certificate of Educational Achievement (NCEA) standards, or other appropriate school leaver qualifications, for all disciplines, and all career paths.

A Delphi survey aims to establish a consensus of informed opinion around key issues by seeking opinions without face-to-face interaction through a series of three to four questionnaires over the course of six to nine months. Each subsequent questionnaire is built on the collective responses of panellists to preceding questionnaires. Interim reports to panellists between rounds are part of the Delphi research design.

Each round in my survey could take 20 to 30 minutes to complete. However, if panellists can afford more time, there is no limit to the depth or breadth of answers they could give to the open-ended questions being explored. A final report of the survey findings will be made available to all panellists as well as the PhD itself once completed.

I would love to include you in this Delphi survey panel. I have attached a formal invitation letter and an informed consent & demographics form for prospective participants. The letter gives more detail about the project and its ethical provisions. The consent & demographics form is for you to complete and return if you would like to be involved in this research. It is a pdf which can be downloaded, opened, filled, and submitted using Adobe Acrobat Reader (see link below). It can also just be printed, filled manually, scanned, and attached to a return email.

When/if I receive your signed consent I will send you a personalised link to the survey's round 1 questionnaire. Round 1 can be submitted up until Fri 2 April.

Kind regards

Chris Morey

https://get.adobe.com/reader/

*This research has been approved by the University of Waikato Faculty of Education Ethics Committee on 23/10/2020. Approval number:* **FEDU071/20**

### *A-1.2 Facebook Groups Post*

Facebook Recruitment Post

Kia ora tatou,
My name is Chris Morey and I am a PhD candidate at the University of Waikato.
I am looking for secondary school teacher colleagues in all learning areas who would like to join the Delphi survey panel which is stage 1 of my research toward a Sustainable Wellbeing centred Metacurriculum for New Zealand Secondary Schools.
This project is exploring what would enable secondary schools in Aotearoa to establish a curriculum constructed around domains of Sustainability and Wellbeing. It will focus particularly on the development of a curriculum framework for students in years 11 to 13, supported by relevant subject knowledge, and linked to integrated collections of related NCEA standards, or other appropriate school leaver qualifications, across all disciplines, and for all career paths.
A Delphi survey aims to establish a consensus of informed opinion around key issues by seeking opinions without face-to-face interaction through a series of three to four questionnaires. Each subsequent questionnaire is built on the collective responses of panellists to preceding questionnaires
The total time commitment could be as little as 60 minutes over the next six to nine months.
If you would like to know more, please private message me with your email address and I will forward you further information about my research project.

Round 1 of this survey is accepting responses until Fr 2 April.

*This research has been approved by the University of Waikato Faculty of Education Ethics Committee on 23/10/2020. Approval number:* **FEDU071/20**

## *A-1.3 Formal letter of invitation sent to the Enviroschools contacts*

**Chris Morey**

**PhD Candidate**

28b White Street
Whitianga, 3510

Mobile: 64-21 123 6301

Email: cm309@students.waikato.ac.nz

THE UNIVERSITY OF WAIKATO
*Te Whare Wānanga o Waikato*

Date

Dear FirstName,

As explained in my covering email, I have been given your name and email address by Anke Nieschmidt at Enviroschools, as an educator who could be interested in being involved as a Delphi survey panellist in my PhD research project at the University of Waikato toward a Sustainable Wellbeing centred Metacurriculum for New Zealand Secondary Schools.

My research is based on two premises:

- that within the next 10 to 20 years humanity must radically transition from a world of nations founded on environmentally, socially, and culturally exploitative GDP growth to a global civilization prioritizing sustainable wellbeing; and
- that education at all levels and for all people, has an integral and vital role to play in this transition.

There are two intended parts to the research. Part one, to which this invitation specifically refers, is a Delphi survey which will explore what a co-constructed framework for a Sustainable Wellbeing Metacurriculum consistent with the New Zealand Curriculum, would look like, and what would enable New Zealand secondary schools to establish such a curriculum for their years 11 to 13 students. The research will focus particularly on the development of a curriculum framework, linked to related collections of NCEA standards or other appropriate school leaver qualifications, for all disciplines and career paths.

The proposed second part of this project is a case study which will eventuate, if one or more of the schools of part one participants indicate an interest in exploring more deeply, a version of the Sustainable Wellbeing Metacurriculum framework emerging from the Delphi survey, for their own students and locality.

A Delphi survey aims to establish a consensus of expert opinion around key issues by seeking opinions without face-to-face interaction through a series of three to four questionnaires over the course of six to nine months. Each subsequent questionnaire is built on the collective responses of panellists to preceding questionnaires. Interim reports to panellists between rounds are part of the Delphi research design.

Each round in this survey could take 20 to 30 minutes to complete. However, if panellists can afford more time, there is no limit to the depth or breadth of answers they can give to the open ended questions posed. A final report of the survey findings will be made available to all panellists as well as the PhD itself once completed.

The optimal expert panel for this Delphi Survey will comprise 30 to 40 teachers and school leaders. Ideally panellists will represent as diverse a range of subject and cultural backgrounds as possible. Panellists with an interest in sustainability, wellbeing-oriented, innovative course design, and assessment for school leaving qualifications will be highly valued contributors.

*This research has been approved by the University of Waikato Faculty of Education Ethics Committee on 23/10/2020. Approval number:* **FEDU071/20**

*A-1.4 Delphi Consent & Background Form*

# Delphi Panellist Informed Consent Form

Toward a Sustainable Wellbeing centred Metacurriculum
for New Zealand secondary schools

There are two parts to this form. Both can be completed by typing directly in the fields provided or you can print the document, complete, and scan, before returning it as an email attachment.

Part 2 (page 2), asks for your demographic and teaching background information for the purpose of characterising the Delphi panel as a whole.

I have read the accompanying 'Delphi participant invitation letter' and 'Delphi Interest & Demographics Form'.

I understand that:

1. My participation in the project is voluntary.
2. I have the right to withdraw at any time, and to withdraw any or all data I have provided at any time up until data analysis commences, (i.e. 48 hours after a Delphi questionnaire has been submitted). If I withdraw, the researcher will destroy any data gathered from me, for that round.
3. Data may be collected from me in the ways specified in the 'Delphi participant invitation letter'. This data will be kept confidential and securely stored.
4. Data obtained from me during the research project may be used in the writing of reports or published papers and in making presentations about the project. This data will be reported without use of my name. While every effort will be made to protect anonymity of all participants, this cannot be guaranteed.
5. I can direct any questions to
   Chris Morey: [cm309@students.waikato.ac.nz].
6. For any unresolved issues I can contact the research Project Supervisor
   Chris Eames [c.eames@waikato.ac.nz ; 07 838 4357].

I give consent to be involved in the project under the conditions set out above.

Name: Click or tap here to enter text.

Date: Click or tap to enter a date.

Please return to Chris Morey: cm309@students.waikato.ac.nz. By [Date]

**Please continue to the demographic and teaching background questions on page 2.**

# Demographic and Teaching background

Answering any of the following teaching background and demographic questions is entirely optional.

However, the more you can tell me the better I will be able to characterise the Delphi panel and its expertise as a whole, when reporting on the survey's findings.

Panellist age range

| under 30 | 30-39 | 40-49 | 50-59 | 60 and over |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

Gender

| Female | Male | Other |
|---|---|---|
| ☐ | ☐ | ☐ |

With which ethnic/cultural background do you most closely identify?: Click or tap here to enter text.

What are your current teaching Subjects (in order of teaching time committed)? Click or tap here to enter text.

Which student year levels do you mostly teach?: Click or tap here to enter text.

How many years of teaching experience do you have?

| less than 2 | 2 to 5 | 6 to 10 | 11 to 20 | more than 20 |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

What experience do you have of assessment for senior secondary school qualifications, including cross-curricula course assessment? (E.g. NCEA, International Baccalaureate, Cambridge) Click or tap here to enter text.

What is your Position/Role(s) within your school/kura/organisation?: Click or tap here to enter text.

Which school/kura/organisation are you teaching at?: Click or tap here to enter text.

**Please return to Chris Morey:** cm309@students.waikato.ac.nz

**Your participation in this research project is much appreciated.**

# A-2 Research Ethics Committee Application Approval

*Te Wānanga Toi Tangata*
**Division of Education**
The University of Waikato
Private Bag 3105
Hamilton,
New Zealand, 3240

Division of Education Research
Ethics Committee (DEREC)
fedu.ethics@waikato.ac.nz
www.waikato.ac.nz

THE UNIVERSITY OF
WAIKATO
*Te Whare Wānanga o Waikato*

23/10/2020

Dear Chris Morey

**Division of Education Research Ethics Committee Application Approved**
**FEDU071/20**

I am pleased to advise you that your ethics application for the project entitled "Toward a Sustainable Wellbeing Metacurriculum for New Zealand Senior Secondary Schools" was approved by Te Wānanga Toi Tangata Division of Education Research Ethics Committee on October 23rd, 2020.

Please be aware that the Te Wānanga Toi Tangata Division of Education Research Ethics Committee must be advised (by memo) of any changes to the details recorded in your ethics application. Please send any such advice to fedu.ethics@waikato.ac.nz. You will receive a memo of approval once the change(s) has been considered.

Kind regards

Co-chairs
Te Wānanga Toi Tangata Division of Education Research Ethics Committee (DEREC)

# A-3 Research Ethics Memo Amendment

**Pro Vice Chancellor's Office**
**Division of Education**
*Te Kura Toi Tangata* **The University of Waikato Private Bag 3105**
**Hamilton, New Zealand**
**Phone +64 7 838 4500**
www.waikato.ac.nz

THE UNIVERSITY OF WAIKATO
*Te Whare Wānanga o Waikato*

## MEMORANDUM

**To: Chris Morey**

**From: Dr Noeline Wright, Co-Chairperson, Research Ethics Committee**

**Date: 27 September 2021**

**Subject:** Research Ethics Memo amendment FEDU071/20

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The Division of Education Research Ethics Committee has considered your application for an amendment to your Approved research ethics application Number FEDU071/20

**Toward a Sustainable Wellbeing Metacurriculum (SWM) for Aotearoa New Zealand Secondary Schools**

We note you wish to add another round of interviews with some or all of the 14 Delphi participants after the 2nd round and before proceeding to the third and possibly fourth rounds. I am pleased to advise that this alteration has received approval.

However, before you begin, please make sure that all acronyms on the interview sheets are explained in full first. This is a requirement of the memo extension.

Please note that all researchers are asked to consult with the Division's Research Ethics Committee in the first instance if you wish to propose further changes to the approved research design.

The Committee wishes you all the best with your research.

**Dr Noeline Wright**
**Co-Chair**
**Education Research Ethics Committee**

# Appendix B for Chapter 4: Co-constructing an SWM framework

## B-1 Delphi Survey #1



THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Default Question Block

### Toward a Sustainable Wellbeing Metacurriculum for New Zealand Secondary Schools

Delphi Survey:Round 1

### S1 Introduction, Contents, and Email

Dear Panellist, Welcome to round 1 of this Delphi Survey.

This questionnaire can be completed in 20 to 30 minutes. However, most of the questions are open ended and there is no word limit to constrain depth or breadth of responses.
Your answers are saved continuously. Until you Submit, you can close the survey at any time and return later using the original emailed link to edit or continue at your convenience.

After you Submit, there is an option available on the last page to print a summary of all your responses.
This round 1 questionnaire will accept responses up until midnight Friday 2 April.

| SURVEY SECTIONS (32 questions in total) | No. Quest |
|---|---|
| 1. Introduction, Contents, and Email | 1 |
| 2. The meaning of key terms to You | 3 |
| 3. Interdisciplinary and Disciplinary school and curriculum structures | 4 |
| 4. Sustainable Wellbeing at the Humankind and Societal level | 5 |
| 5. Sustainable Wellbeing at the level of the Individual and their interpersonal Relationships | 7 |
| 6. Toward a Sustainable Wellbeing Metacurriculum for Your School | 3 |
| 7. Local Community support for a Sustainable Wellbeing Metacurriculum in Your School | 3 |
| 8. Nationwide support for a Sustainable Wellbeing Metacurriculum | 4 |
| 9. Survey Experience Feedback | 2 |

Please enter your Email Address**

** This is the only required question. Email addresses will allow me to track panellist's responses across the Delphi rounds.

### S2 The meaning of key terms to You

What does the word 'Sustainability' mean to you?

What does the word 'Wellbeing' mean to you?

What does the term 'Sustainable Wellbeing' mean to you?

## S3 Interdisciplinary and Disciplinary school and curriculum structures

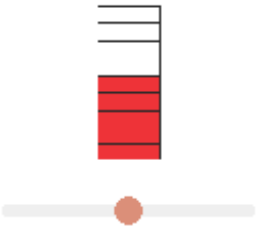
The pros and cons of Interdisciplinary (cross-curricula), and Disciplinary (based on learning areas and subjects) curriculum designs and school timetable structures, have long been debated in education.

Select an option from the list below that for you, best fills the blank space in the following sentence:

I believe Sustainable Wellbeing education could be best implemented with a framework that _____ curriculum design based on learning areas and subjects.

follows ○ | is integrated with ○ | supplements ○ | complements ○ | leads ○ | subsumes ○ | replaces ○ | Other (please specify) ○

What share of the weekly senior school timetable would you ideally like to see dedicated to cross-curricula Sustainable Wellbeing directed learning as compared to specialised subject directed learning?



Add any comment on your choices for the two questions above?

What does the word 'metacurriculum' mean or suggest to you?

# S4 Sustainable Wellbeing Metacurriculum at the Human and Societal level

In my research I take the term 'metacurriculum' to mean; some coherent construction of Interdisciplinary and Disciplinary education that connects all elements to a central organsing ideal.

I suggest three interrelated domains of Sustainable Wellbeing as a first step at the Humankind and Societal level, toward a Sustainable Wellbeing Metacurriculum.

- Ecosphere
- Global Justice, and
- Cultural Vision

The questions in this section aim to identify what Knowledge, Issues, and Big Ideas within these domains are most important to include in a Sustainable Wellbeing Metacurriculum for years 11 to 13 students.
Any examples or localised contexts that you can give for your Knowledge, Issues, and Big Ideas will also be very helpful.

'ECOSPHERE': refers to humanity's relationship with its planetary, ecological, and built environment.

In the ECOSPHERE domain; what Knowledge, Issues, and Big Ideas should be foregrounded in a Sustainable Wellbeing Metacurriculum for years 11 to 13 students?

'GLOBAL JUSTICE': refers to humanity's world of social, political, and community relationships.

In the GLOBAL JUSTICE domain; what Knowledge, Issues, and Big Ideas should be foregrounded in a Sustainable Wellbeing Metacurriculum for years 11 to 13 students?

'CULTURAL VISION': refers to humanity's' relationship with its own cultural

histories, its present, and its future.

In the CULTURAL VISION domain; what Knowledge, Issues, and Big Ideas should be foregrounded in a Sustainable Wellbeing Metacurriculum for years 11 to 13 students?

Rate the usefulness of this three Domain Framework for thinking about Sustainable Wellbeing Education.

| Poor | Fair | Good | Very good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Comments on or alternate suggestions to, the three Domain Framework

## S5 Sustainable Wellbeing Metacurriculum

## at the Individual and interpersonal Relationships level

I suggest four interrelated domains of Sustainable Wellbeing as a first step at the Individual and interpersonal relationships level, toward a Sustainable Wellbeing Metacurriculum.

- Action-Hands
- Affect-Heart
- Cognition-Head, and the central
- Integrating-Self

The questions in this section aim to identify the Skills, Competencies, and Dispositions within these domains that are most important for years 11 to 13 students to develop in a Sustainable Wellbeing Metacurriculum .
Any examples or localised contexts that you can give that develop these Skills, Competencies, and Dispositions will also be very helpful.

'ACTION-HANDS', refers to the Individual's physical relationships with their natural and built environment, other people, and their own body

In the ACTION-HANDS domain; what Skills, Competencies, and Dispositions should be developed by years 11 to 13 students to in a Sustainable Wellbeing Metacurriculum?

'AFFECT-HEART', refers to the Individual's emotional relationships with natur others, and self.

In the AFFECT-HEART domain; what Skills, Competencies, and Dispositions should be developed by years 11 to 13 students in a Sustainable Wellbeing Metacurriculum?

'COGNITION-HEAD', refers to the Individual's sense perception-thought relationships with nature, others, and self.

In the COGNITION-HEAD domain; what Skills, Competencies, and Dispositions should be developed by years 11 to 13 students in a Sustainable Wellbeing Metacurriculum?

The 'INTEGRATING-SELF', organises HANDS, HEART, and HEA a coherent whole.

What does the term 'INTEGRATING-SELF' mean to you?

In the INTEGRATING-SELF domain; what Skills, Competencies, and Dispositions should be developed by years 11 to 13 students in a Sustainable Wellbeing Metacurriculum?

Rate the usefulness of this four Domain Framework for thinking about Sustainable Wellbeing Education.

| Poor | Fair | Good | Very good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Comments on or alternate suggestions to, the four Domain Framework

## S6 Toward a Sustainable Wellbeing Metacurriculum for Your School

Considering the implementation of a Sustainable Wellbeing Metacurriculum for years 11 to 13 students in your school:

What might be the key ENABLING factor(s) in your school?

What might be the key CONSTRAINING factor(s) in your school?

What would need to CHANGE in your school to facilitate this implementation?

## S7 Local Community support for a Sustainable Wellbeing Metacurriculum in Your school

Considering the implementation of a Sustainable Wellbeing Metacurriculum for years 11 to 13 students in Your school:

What could be the key ENABLING factor(s) in your Local Community?

What could be the key CONSTRAINING factor(s) in your Local Community?

What would need to CHANGE in your Local Community to support this implementation?

## S8 Nation wide support for a Sustainable Wellbeing Metacurriculum

Considering the implementation of a Sustainable Wellbeing Metacurriculum for years 11 to 13 students in New Zealand schools:

What could be the key ENABLING factor(s) in current Education or other government policy at the NATIONAL level?

What could be the key CONSTRAINING factor(s) in current Education or other government policy at the NATIONAL level?

What would need to CHANGE in current Education or other government policy at the NATIONAL level to support this implementation?

What would need to CHANGE in NZ society and its relationship with education?

**Block 1**

## S9 Survey Experience

Please add here any suggestions, comments, or questions regarding any aspect of this research project?

The time I spent completing this survey was:

less than I expected more than I expected

| | | |
|---|---|---|
| much less than I expected | about what I expected | much more than I expected |

This research has been approved by the University of Waikato Faculty of Education Ethics Committee on 23/10/20
Approval number: FEDU071/20

## B-2 The SWM Framework Individual-Interpersonal Relationships Level

This appendix presents the findings from the first Delphi Survey round related to the Intrapersonal and Interpersonal Relationships Level of the emerging Sustainable Wellbeing Metacurriculum (SWM) framework.

*Table B-1 The nine themes identified for the 'Integrating Self' domain describing the skills, competencies, and dispositions to be developed, showing some typical suggestions from teachers assigned to each Subdomain and the number of panellists contributing*

| Levels | The 'Integrating Self' Subdomains | Descriptors | Teacher Suggestions (examples) | No. references |
|---|---|---|---|---|
| **Total Self** | | | | **1** |
| | **Integrating the inner, social and environmental Self** | Developing the ability to see yourself as a whole person interacting with the whole world around you | | 1 |
| **Intrapersonal Self Integration subdomains** | | | | **15** |
| 1 | **Self-directed learning** | Developing the ability to determine one's direction on the path of learning | an independent, motivated learner with the ability to research | 3 |
| 2 | **Self-Awareness** | Developing the ability to reflect on your sustainable living and wellbeing | reflection exercises; Disposition as a critical thinker with self-awareness | 3 |
| 3 | **Self-Regulation** | Developing self-discipline, good judgement and taking responsibility for yourself | ability to regulate self in appropriate ways in different situations; perseverance | 3 |
| 4 | **Self-Assurance** | Developing agency and confidence in your abilities | self-belief; agency | 3 |
| 5 | **Adaptability** | Developing flexibility and responsiveness in action, feeling, thinking and relationships | Adaptability; responsiveness; flexibility | 3 |
| **Interpersonal Taha whanau Self Integration subdomains** | | | | **9** |
| 1 | **Developing a wider view of self** | Developing and encouraging others to a wider view of life and Self | Being able to see the bigger picture and its relevance. | 6 |
| 2 | **Confidence in collaboration and communication** | Developing confidence in all domains of collaboration and communication to participate positively in your community | Interpersonal skills; confidence in collaboration and communication | 2 |
| 3 | **Leadership skills** | Developing abilities to make significant contributions to the sustainable wellbeing of your community and humankind | Leadership skills | 1 |

*Table B-2 The SWM Intrapersonal level Domains and Subdomains describing the skills, competencies, and dispositions to be developed showing some typical suggestions from teachers assigned to each Subdomain and the number of teacher references assigned to each*

| Level | Domain | | Subdomain titles | Subdomain descriptors | Teacher Suggestions (examples) | |
|---|---|---|---|---|---|---|
| Integrating-Self | | | | | | |
| Intrapersonal | Action | | | Meta-Action (Self-Awareness in doing and not doing) E.g. Taha tinana. Physical resilience, creativity, perseverance, and agency for action-based outcomes | Tinana-physical well-being.; Perseverance, Energy, self-regulation; Creativity, Resilience | 10 |
| | | 1 | active-Action | Motor skills, coordination, balance | Practical skills are required for dexterity, which many students lack these days | 3 |
| | | 2 | feeling-Action | Action guided by feeling and judgement,i.e. Artistry | Able to adapt if needed, not seen as a failure or anything to get upset about | 1 |
| | | 3 | thinking-Action | Action competence. Strategic Action | Practical Problem solving- Action competence | 2 |
| | Feeling | | | Meta-affect: Emotional self-awareness. Equanimity and responsiveness. E.g. Taha hinengaro, gratitude | being able to identify their own triggers for stress and anxiety. … | 4 |
| | | 1 | active-Feeling | Feeling that leads to action or the moderation of action | artistic expression; [emotional] resilience/grit; Patience; enthusiasm | 8 |
| | | 2 | feeling-Feeling | Feeling that leads to empathy and good judgement | values such as respect; self-love | 2 |
| | | 3 | thinking-Feeling | Feeling that leads to conclusions, insights, or inspiration | Emotional intelligence; A media diet [self-regulation and discrimination] | 3 |
| | Thinking | | | Metacognition. Self-awareness in thinking. The capacity to silence, direct, and observe one's thinking. Long-view biographical thinking | Explicit teaching of thinking skills and strategies, higher-order thinking. | 2 |
| | | 1 | active Thinking | Thinking that is persevering, concentrated, and resourceful | Building memory and attention to focus on tasks. | 7 |
| | | 2 | feeling Thinking | Thinking that is calm, receptive, inspired, and self-confident | Hinengaro-mental well-being; responsiveness | 2 |
| | | 3 | thinking Thinking | Thinking that is clear, critical, imaginative, curious and penetrating | Critical thinking; [awareness of] biases; Innovation | 7 |

*Table B-3 The SWM Interpersonal (Taha-Whanau) level Domains and Subdomains describing the skills, competencies, and dispositions to be developed showing some typical suggestions from teachers assigned to each Subdomain and the number of teacher references assigned to each*

| Level | Domain | | Subdomain titles | Subdomain descriptors | Teacher Suggestions (examples) | |
|---|---|---|---|---|---|---|
| Integrating-Self | | | | | | |
| Interpersonal | Action | | | Awareness of and responding to the physical realities of immediate others. E.g. Reducing carbon footprint, Community SW projects | Reducing carbon footprint, living, and consuming sustainably | 9 |
| | | 1 | willing-Action | Eco-Trades and practical skills | Eco housing, Eco transport; Habitat restoration; Gardening | 14 |
| | | 2 | feeling-Action | Sharing empathy with others for nature and other species | Collaboration; kindness, care; Responsiveness to environment | 13 |
| | | 3 | thinking-Action | Planning collaborative projects and observation of nature | Action competence - the ability to take thoughtful action | 5 |
| | Feeling | | | Socio-emotional engagement, perspective, and learning. | E.g. framing issues as solvable, [collaboratively] artistic expression | 5 |
| | | 1 | active-Feeling | Interpersonal feelings that are actively receptive, controlled or expressed | active listening; assertive conversations and actions | 4 |
| | | 2 | feeling-Feeling | Feeling the feelings of others. Empathy. | the ability to walk in another person's shoes. | 9 |
| | | 3 | thinking-Feeling | Feeling in relationships moderated by understanding, communication and problem-solving skills | Social skills that allow for more meaningful conversations, | 12 |
| | Thinking | | | Communicated and shared understandings. E.g. Long-view perspective thinking for whanau, Articulate communication | social skills such as communication | 1 |
| | | 1 | active Thinking | Thinking directed toward applying knowledge, skills, and dispositions in working with others | Studying seasonal foods and a healthy diet | 3 |
| | | 2 | feeling Thinking | Thinking directed toward awareness of and building relationships with nature and others | interdependency/metaphysical perspectives/secular spirituality | 3 |
| | | 3 | thinking Thinking | Critical planning and visionary thinking for cooperative undertakings | Critical thinking skills about the future, solution-focused. | 4 |

B-3 Delphi Survey #2



THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Section 1 : Introduction

# Toward a Sustainable Wellbeing Metacurriculum (SWM) for New Zealand Secondary Schools

## Delphi Survey: Round 2

## Section 1 : Introduction

Dear Panellist,
**Welcome to Round 2 of this Delphi Survey.**

The estimated completion time for this questionnaire is 15 to 20 minutes depending on how much comment feedback you want to add.
All comment questions are Optional.

Your answers are saved continuously.
Until you Submit, you can close the survey at any time and return later using the original emailed link to edit or continue at your convenience.

After you submit, there is an option available on the last page to print a summary of all your responses.
This round 2 questionnaire will accept responses up until midnight Saturday 28 August (extended from original close date of 21 Aug in light of Covid level 4 disruption).

This research has been approved by the University of Waikato Faculty of Education Ethics Committee on 23/10/2020.
Approval number: FEDU071/20

| SURVEY SECTIONS | No. Qns |
|---|---|
| 1. Introduction | |
| 2. Evaluating the Sustainable Wellbeing (SW) Subdomains at the Humankind and Societal level | 27 |
| 3. Overall Evaluation of the SWM framework and your teaching relationship to it | 8 |
| 4. Survey Experience Feedback | 2 |
| **Total** | 37 |

Evaluating the SWM Subdomains (Header page)

## Section 2 : Evaluating and Editing 9 (provisional) Subdomains for a Sustainable Wellbeing Metacurriculum (SWM) at the Human and Societal level

**In this section you are asked to evaluate each of the 9 SWM subdomains and to comment on, or add to its Outcome Goal Descriptors if you wish.**

- There is no expectation that teachers would need to develop specialist teaching knowledge and skills in any more than one or two subdomains.
- However, there is the hope that teachers would contribute their own subject expertise to support projects/courses in a wide range of these subdomains;
  - through collaborative project/course planning and team teaching and/or
  - by extending their current subject based courses to support SW curriculum objectives and projects in all three SWM domains.

## The 3 SWM Domains and 9 (provisional) Subdomains

**ECOSPHERE**: Humanity's relationship with its planetary, ecological, and built environment.

- Maker-Recyclers
- Regenerative-Cultivators
- Kaitiaki Hunter-Gatherers

**GLOBAL JUSTICE**: Humanity's world of social, political, and community relationships.

- Whanau and Community
- Rights and Responsibilities
- Power and Influence

**CULTURAL VISION**: Humanity's relationship with its cultural histories, its present, and its future.

- Our cultural inheritance
- Others' cultures and World views
- Cultural evolution and Individual agency

Maker-Recyclers

## Ecosphere

### Maker-Recyclers

Outcome Goal Descriptors

- **Achieve Planet Cyclic Manufacturing and Zero-waste technologies.**
- **Explore high and low-tech renewable energy solutions.**
- **Develop Eco-housing/cities, Eco-transport, and Eco-communication infrastructure.**

This **Subdomain Title** is appropriate for its Outcome Goal Descriptors.

| Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Rate the usefulness of these **Outcome Goal Descriptors** as a focus for project/course planning and teaching in a Sustainable Wellbeing Metacurriculum for years 11 to 13.

| Poor | Fair | Good | Very Good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Suggest changes or extensions you would recommend, if any, to this **Subdomain Title** AND/OR its **Outcome Goal Descriptors**.

Regenerative-Cultivators

Ecosphere

## Regenerative-Cultivators

**Outcome Goal Descriptors**

- **Regenerate abundant, cultivated, and managed Ecosystems: Fisheries, Agriculture, Horticulture, Forestry, etc.**
- **Understand our interdependent place in the inter-species web of life.**
- **Develop hands-on low tech cultivation and eco-friendly high-tech sustainable resource management skills.**

This **Subdomain Title** is appropriate for its Outcome Goal Descriptors.

| Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Rate the usefulness of these **Outcome Goal Descriptors** as a focus for project/course planning and teaching in a Sustainable Wellbeing Metacurriculum for years 11 to 13.

| Poor | Fair | Good | Very Good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Suggest changes or extensions you would recommend, if any, to this **Subdomain Title** AND/OR its **Outcome Goal Descriptors**.

Kaitiaki Hunter-Gatherers

Ecosphere

## Kaitiaki Hunter-Gatherers

**Outcome Goal Descriptors**

- **Explore our relationship to undomesticated ecosystems and planetary processes.**
- **Reverse Biodiversity loss and re-wild local ecosystems for planetary wellbeing.**
- **Understand, mitigate and adapt to Climate Change.**

This **Subdomain Title** is appropriate for its Outcome Goal Descriptors.

| Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Rate the usefulness of these **Outcome Goal Descriptors** as a focus for project/course planning and teaching in a Sustainable Wellbeing Metacurriculum for years 11 to 13.

| Poor | Fair | Good | Very Good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Suggest changes or extensions you would recommend, if any, to this **Subdomain Title** AND/OR its **Outcome Goal Descriptors**.

Whanau and Community

## Global Justice

### Whanau and Community

**Outcome Goal Descriptors**

- **Overcome malnutrition, poor wellbeing, social isolation and exploitation.**
- **Develop manaakitanga, community service,**
- **Know what respectful interpersonal relationships look like, both physical and on social media.**

This **Subdomain Title** is appropriate for its Outcome Goal Descriptors.

| Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Rate the usefulness of these **Outcome Goal Descriptors** as a focus for project/course planning and teaching in a Sustainable Wellbeing Metacurriculum for years 11 to 13.

| Poor | Fair | Good | Very Good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Suggest changes or extensions you would recommend, if any, to this **Subdomain Title** AND/OR its **Outcome Goal Descriptors.**

Rights and Responsibilities

## Global Justice

### Rights and Responsibilities

**Outcome Goal Descriptors**

- **Assert rights and accept responsibilities.**
- **Eliminate poverty and injustice with greater equity, mediation, and good governance.**
- **Ensure empowering, fair and fact-checked media.**

This **Subdomain Title** is appropriate for its Outcome Goal Descriptors.

| Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Rate the usefulness of these **Outcome Goal Descriptors** as a focus for project/course planning and teaching in a Sustainable Wellbeing Metacurriculum for years 11 to 13.

| Poor | Fair | Good | Very Good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Suggest changes or extensions you would recommend, if any, to this **Subdomain Title** AND/OR its **Outcome Goal Descriptors.**

Power and Influence

## Global Justice

### Power and Influence

**Outcome Goal Descriptors**

- **Understand political and financial systems including activism and lobbying.**
- **Contribute to an ecologically realistic, equitable global direction in corporate, political, and social welfare systems.**
- **Practice leadership and collaboration.**

This **Subdomain Title** is appropriate for its Outcome Goal Descriptors.

| Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Rate the usefulness of these **Outcome Goal Descriptors** as a focus for project/course planning and teaching in a Sustainable Wellbeing Metacurriculum for years 11 to 13.

| Poor | Fair | Good | Very Good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Suggest changes or extensions you would recommend, if any, to this **Subdomain Title** AND/OR its **Outcome Goal Descriptors**.

**Our cultural inheritance**

## Cultural Vision

### Our cultural inheritance

**Outcome Goal Descriptors**

- **Understand whakapapa, our own warrior history and inherited taonga.**
- **Appreciate the benefits and costs of trade and technology.**
- **Critique and correct our errors, unconscious judgements, and premises, including those of established disciplines.**

This **Subdomain Title** is appropriate for its Outcome Goal Descriptors.

| Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Rate the usefulness of these **Outcome Goal Descriptors** as a focus for project/course planning and teaching in a Sustainable Wellbeing Metacurriculum for years 11 to 13.

| Poor | Fair | Good | Very Good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Suggest changes or extensions you would recommend, if any, to this **Subdomain Title** AND/OR its **Outcome Goal Descriptors**.

**Others' cultures and World views**

## Cultural Vision

## Others' cultures and World views

**Outcome Goal Descriptors**

- **Actualise the potential gains from multiculturalism and overcome its vulnerabilities.**
- **Appreciate the otherness of our perspective from the others' viewpoints.**
- **Understand the interconnectedness of ethnicities, religions, nations, and social movements.**

This **Subdomain Title** is appropriate for its Outcome Goal Descriptors.

| Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Rate the usefulness of these **Outcome Goal Descriptors** as a focus for project/course planning and teaching in a Sustainable Wellbeing Metacurriculum for years 11 to 13.

| Poor | Fair | Good | Very Good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Suggest changes or extensions you would recommend, if any, to this **Subdomain Title** AND/OR its **Outcome Goal Descriptors**.

**Cultural evolution and Individual agency**

## Cultural Vision

## Cultural evolution and Individual agency

**Outcome Goal Descriptors**

- **Imagine and Innovate for a biospherically-conscious world culture.**
- **Consider Individualism vs. collectivism and the nature of free will in an AI-assisted world of surveillance and consumer prediction.**
- **Navigate identity cultures (e.g. LGBTQ+, urban vs rural, generational, etc.)**

This **Subdomain Title** is appropriate for its Outcome Goal Descriptors.

| Strongly disagree | Somewhat disagree | Neither agree nor disagree | Somewhat agree | Strongly agree |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Rate the usefulness of these **Outcome Goal Descriptors** as a focus for project/course planning and teaching in a Sustainable Wellbeing Metacurriculum for years 11 to 13.

| Poor | Fair | Good | Very Good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Suggest changes or extensions you would recommend, if any, to this **Subdomain Title** AND/OR its **Outcome Goal Descriptors**.

**Overall Evaluation of the SWM framework Subdomains**

# Section 3 : Overall Evaluation and Application of the SWM framework Subdomains

Rate the overall usefulness of the the nine subdomains at the Human and Societal level presented above for thinking about course and project design for Sustainable Wellbeing

Education.

| Poor | Fair | Good | Very Good | Excellent |
|---|---|---|---|---|
| ○ | ○ | ○ | ○ | ○ |

Comment on the rating you've given above. Are their essential improvements that could be made? Are the subdomains coherent? Are they comprehensive? Is there anything missing?

## How will the SWM subdomains apply to your teaching? Consider the following 40/60 timetable scenario:

Your school is planning to implement an SWM trial for years 11 to 13. 40% of the timetable will be allocated to Cross-Curricula project/courses with the other 60% given to Subject-Based specialist courses (as suggested by the panel's round 1 responses).

The Cross-Curricula and Subject-Based courses will be mutually supportive and centred on Sustainable Wellbeing.

You are asked to join one of 9 teaching teams planning cross-curricular project/courses. Each teaching team is responsible for one of the SWM subdomains. The subdomain determines the type of project/courses undertaken, in the school's local context.

Teachers are encouraged to explore the relationship of their project/course outcome goals to all three of the SWM domains, including Action, Feeling, and Thinking at the Intrapersonal and Taha Whanau (Interpersonal) levels.

**Which of the Cross-Curricular team(s) (if any) would you join?**
On the Next page, Select and rank up to 3 choices.

**Which SWM subdomains would benefit from or contribute to your Subjects*** big ideas and significant learning outcomes/foci?**
On the Following page, Select as many SW subdomains as apply.

** ("Your Subjects" meaning, as entered in the Informed Consent & Background form you provided for this Delphi Survey.)

## In the 40/60 timetable scenario ...

Which of the Cross-Curricular team(s) (if any) would you join?
Select and rank up to 3 choices (most preferred at the top).

| Items | Preferred Subdomains for Cross-Curricula Team Teaching |
|---|---|
| Maker-Recyclers | |
| Regenerative-Cultivators | |
| Kaitiaki Hunter-Gatherers | |
| Whanau and Community | |
| Rights and Responsibilities | |
| Power and Influence | |
| Our cultural inheritance | |
| Others' cultures and World views | |

Cultural evolution and Individual agency

Comment on your choices above?

### In the 40/60 timetable scenario ...

In your years 11-13 Subject-Based courses, which SWM subdomains would benefit from or contribute to your Subjects' big ideas and significant learning outcomes/foci?
(Select all that apply by clicking on the boxes).

| Ecosphere | Global Justice | Cultural Vision |
|---|---|---|
| ☐ Maker-Recyclers | ☐ Whanau and Community | ☐ Our cultural inheritance |
| ☐ Regenerative-Cultivators | ☐ Rights and Responsibilities | ☐ Others' cultures and World views |
| ☐ Kaitiaki Hunter-Gatherers | ☐ Power and Influence | ☐ Cultural evolution and Individual agency |

☐ All

Comment on your choices above?

In your school **currently**, for which of the SW subdomains, if any, are some or all of the outcome goals being effectively addressed in the years 11 to 13 curriculum, that you know of? (Select all that apply by clicking on the boxes).

| Ecosphere | Global Justice | Cultural Vision |
|---|---|---|
| ☐ Maker-Recyclers | ☐ Whanau and Community | ☐ Our cultural inheritance |
| ☐ Regenerative-Cultivators | ☐ Rights and Responsibilities | ☐ Others' cultures and World views |
| ☐ Kaitiaki Hunter-Gatherers | ☐ Power and Influence | ☐ Cultural evolution and Individual agency |

☐ None

Comment on your choices above?

Survey Experience

## Section 4 : Survey Experience

Please add here any suggestions, comments, or questions regarding any aspect of this research project to date?

The time I spent completing this survey was:

| much less than I expected | less than I expected | about what I expected | more than I expected | much more than I expected |
| --- | --- | --- | --- | --- |
| ○ | ○ | ○ | ○ | ○ |

## **B-4** Email—Subject: Sustainable Wellbeing Metacurriculum (SWM) Delphi-Round 2 report and Interview invitation

Toward a Sustainable Wellbeing centred Metacurriculum (SWM)
for New Zealand Secondary Schools

Dear FirstName,

As I worked through the responses to the second round of this Delphi survey, it became increasingly clear to me that a round of one-to-one interviews with panellists would be extremely helpful at this stage of the project, before going on to the third and fourth Delphi rounds. A semi-structured interview would allow me to better understand your unique educational context and perspective on this research and to answer any questions you may have at this stage about it, in a way that pre-defined survey questionnaires cannot.

Attached is my report for panellists on the findings of the SWM Delphi round 2 questionnaire. The report opens with a two-page executive summary that outlines the material which will inform the interview questions. I will be especially interested to hear your opinion on the significant modifications that have been suggested for the SWM framework subdomain titles and goals which are detailed in part 4 of the report, and the reasoning behind these modifications, presented in part 3.2.

The interviews will be conducted and recorded using the University of Waikato's Zoom account. The recordings will be kept confidential and securely stored. Each interview will take no more than one hour but could be as short as 20 minutes depending upon your availability.

Having corresponded with you via email and the survey for almost nine months now, I would love to meet and talk with you about your sustainability and wellbeing teaching directly, even if only over Zoom. If you accept this invitation to be interviewed, you will have the right to withdraw at any time, and to withdraw any or all data provided at any time up until data analysis commences, (i.e. 48 hours after the interview). If you withdraw, I will destroy any data related to the interview. A transcript of the interview will be provided within the following two weeks, for your verification (including the option to withhold particular sections of the text from publication). If you cannot participate in the interviews, this will not preclude you from joining in rounds 3 and 4 of the Delphi survey.

If you would like to be involved in this interview stage of the project, please sign and return the accompanying informed consent form. You can nominate a preferred date and time for the interview on the form but this may need to be negotiated according to other panellists' requested times. Please select a date on or before Friday, 10 December. I am unavailable on Wednesdays and Thursdays between 14:00 and 18:00 due to tutoring commitments with years 11 to 13 students. I will send you the Zoom link and an outline of the semi-structured interview questions, at least two days before the interview.

Kind regards

Chris Morey

This research has been approved by the University of Waikato Faculty of Education Ethics Committee on 23/10/2020. Approval number: FEDU071/20

# Appendix C for Chapter 5: Using the Sustainable Wellbeing Metacurriculum (SWM) Framework

## C-1 Semi-structured Interview Schedule

Toward a Sustainable Wellbeing Metacurriculum (SWM)
for Aotearoa New Zealand Secondary Schools

The interview will be semi-structured into seven sections as follows. The questions suggested here are examples of what I am intending only and could be adapted during the interview to accommodate whatever relevant directions arise during the conversation.

1. **Specific questions for Individual panellists**
   1.1. These questions will relate directly to unique comments made or questions asked by individual panellists in their Delphi round 2 response.
2. **General questions related to the 'Review of Delphi 2 for panellists'**
   2.1. Are the revised subdomain titles and Outcome Goal Descriptors/Direction (OGD) an improvement compared to the Delphi round 2 versions?
   2.2. Do the stated intentions of Titles & OGDs (all subdomains) align with your conception of an SWM?
   2.3. How could the Titles & OGDs (all subdomains) be further improved to better align with your conception of an SWM
   2.4. Do the revised OGDs adequately reference the domains and subdomains of the SWM Intrapersonal and Taha Whanau levels of pedagogy?
      2.4.1. How might that be better expressed?
3. **Potential for SWM exploration/implementation in your school**
   3.1. Is there any timetabled provision for cross-curricular lessons in your school's year 11 to 13 classes? and is that provision optimal? Could it be increased/decreased?
   3.2. What do you think of the idea that the CC component of the SWM would be considered as Core/compulsory for all year 11-13 students with year 11 taking project/courses in all 9 subdomains; year 12 participating in as few as 3 (one from each domain) and year 13 being encouraged to undertake a major project/dissertation in a single Sustainable Wellbeing (SW) domain or subdomain?
   3.3. In round 2 your answer to the question:
   "In your school currently, for which of the SW subdomains, if any, are some or all of the outcome goals being effectively addressed in the years 11 to 13 curriculum, that you know of? "
   was [...]
      3.3.1. Could the SWM framework fill the gaps you identified [if any] and how?
      3.3.2. Could the SWM framework improve the school's effectiveness in addressing SW across all subdomains and how?
   3.4. Are there SW practices, projects, courses in place in your yrs 11-13 curriculum that could serve as exemplars for promoting/disseminating the SWM more widely in Aotearoa NZ?
   3.5. How could the SWM framework be adapted to best fit your school's circumstances?
   3.6. What level of interest in trialling a localised implementation of the SWM for years 11-13 do you think there would be amongst your school's senior leadership, and teachers?

4. **Relating the SWM subdomains to Learning Area & Subjects**
   4.1. The Delphi survey round 3 will include a section asking you to relate your specialist learning-area(s) content and principles to each of the SWM subdomains under specific headings [like subject, strands, learning outcomes, and 'Big Ideas'—as this term is used in the current New Zealand Ministry of Education (MoE) curriculum refresh exercise.
      4.1.1.- What would be the best way to do this: open-ended text, prepared multi-choice and menu lists, a combination of both?
      4.1.2.- Is this list of headings insufficient, about right, too detailed, ...?
   4.2. The Delphi survey round 3 will ask you to suggest for each of the SWM subdomains, the most useful NCEA standards or other appropriate assessment-accreditation options in your specialist learning-area(s), to support the subdomain OGDs.
      4.2.1.- What would be the best way to do this: open-ended text, prepared multi-choice and menu lists, or a combination of both?
5. **Creating an SWM CC Project/Course Outline**
   5.1. The Delphi survey round 3 will include a section asking you to Create an SWM Cross-Curricular project/course Outline, in a particular subdomain, using specific headings [like Title; SWM OGDs; particular learning objectives, (actions/products, social, thinking/knowledge, etc), associated subject area topics, Most likely NCEA standards, setting, etc ]. The project/course could involve from 30 to 100 hours of teacher-student contact time.
   Is this a question you would be willing to answer and does that list of project/course design headings seem appropriate and manageable?
   5.2. Your three subdomain preferences from Delphi round 2 were [...].
   What would your choices have been if you had to choose one subdomain from each domain?
   5.3. Would you be willing to create the SWM cross-curricular project/course working in the [...] subdomain [to be negotiated based on the panellists stated preferences in round 2 and to get coverage of all subdomains if possible, across the panel].
   5.4. Are the Intrapersonal and Taha Whanau pedagogical levels of SW sufficiently well defined to be useful in the context of a specific SWM project/course?
      5.4.1. Are they easier to apply in this specific context?
      5.4.2. How might they be improved for this purpose?
6. **Assessment for an SWM**
   6.1. Do the current NCEA standards provide an adequate accreditation for students achievement within the SWM framework?
   6.2. Will the proposed standards from the Review of NCEA Achievement standards provide adequate accreditation for students achievement within the SWM framework?
7. **Closing General Comments**
   7.1. I would like to include appropriate Te Reo words and phrases in all domain/subdomain titles and descriptors if possible, but my knowledge is meagre and I don't want to get it wrong.
      7.1.1.- Do you have any suggestions for any of the SWM domains or subdomains?
   7.2. Is there anything else about this research project you would like to comment on in closing?

## C-2 Delphi Survey #3

### *C-2.1 Delphi Survey 3: p. 1 to 10 Opening pages*

Whereas the questionnaires for rounds 1 and 2 of the Delphi Survey can be printed on 10 or fewer pages, the third round requires 118 pages. Round 3 involved many optional routes for participants, to define their Unit Outlines selecting a small set of SWM subdomains, Sustainable Wellbeing Goals, New Zealand Curriculum (NZC) Achievement Objectives and National Certificate of Educational Achievement (NCEA) standards from the many possible combinations. The following 27 pages from the third round are selected to show those sections of the questionnaire most relevant to the study's main findings. The text with the leading $ sign enclosed in {} is formatting code used by the Qualtrics Survey engine and not visible to respondents.

THE UNIVERSITY OF WAIKATO
*Te Whare Wānanga o Waikato*

## Section 1 : Introduction

**Toward a Sustainable Wellbeing Metacurriculum (SWM)**
**for New Zealand Secondary Schools**

### Welcome to this
### Delphi Survey Round 3 : A Project/Course Outline

- Completion time for this questionnaire could be anything from 20 mins to an hour depending on how much detail you want to provide and which sections you choose to skip.
- Your answers are saved continuously.
- Until you Submit, you can close the survey at any time and return later using the original emailed link to edit or continue at your convenience.
- After you submit, there is an option available on the last page to print a summary of all your responses in pdf format.
- This questionnaire (3_02.3) will accept responses up until 23:59 Friday 16 December 2022, but you will need a new personalised link to access it after 25 March.

This research has been approved by the University of Waikato
Faculty of Education Ethics Committee on 23/10/2020. Approval number: FEDU071/20

**SURVEY SECTIONS**

## 1. Introduction to Round 3

- In this third round of the SWM Delphi survey you are asked to write a Project or Course outline centred on Sustainable Wellbeing for years 11 to 13 students using the SWM framework
- The outline could be for a project or course that you are still planning or one that you have already taught.
- The questionnaire asks you to nominate an SWM subdomain within which to ***Anchor*** your project or course and provides structured fields for the definition of key unit planning characteristics.
- You can also identify other subdomains and their Sustainable Wellbeing Goals as critically ***Connected*** to your ***Anchor*** subdomain within your local, Ecospheric, Social, and Cultural context.
- At the end of the project or course outline section there is an upload option for up to 3 supplementary Unit Plan documents you may already have.
- You can also copy and paste details such as NCEA standards numbers and titles, from existing Unit Plans into the predefined text fields in this questionnaire.

### Timetable structure and Hours

## 2. School Timetable structure and Hours

The SWM comprises two distinct student contact time lesson modes: Cross-Curricular Projects and Subject-Based Courses.

- **Cross-Curricular Projects** use disciplinary content as required to support Sustainable Wellbeing Goals and their inter-connective breadth.
- **Subject-Based Courses** use the context and setting of Sustainable Wellbeing Projects current in the students' timetable, to develop subject-specialisation and depth.

In your school timetable, what percentage of lesson times reserved specifically for the Cross-Curricular Project lesson mode, were available or are you recommending? The default choice is 40% (which was the average value for this choice from rounds one and two), but you can select any % here.

Share of timetable %

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Cross-curricular Mode 40

Is the outline you are providing for a ***Cross-Curricular*** **Project** Or a **Subject-Based Course?**

| ***Cross-Curricular*** | | ***Subject-Based*** |
|---|---|---|
| Project | Course | |
| ○ | ○ | |

In which Learning Area is your Subject Based ${q://QID331/ChoiceGroup/SelectedChoices} located?

- ○ English
- ○ The Arts
- ○ Health & PE
- ○ Learning Languages
- ○ Mathematics & Statistics
- ○ Science
- ○ Social Sciences
- ○ Technology

Assuming 825 total contact hours being available to senior students for the year (all things being 'normal'), i.e. 25 hours per week for 33 weeks (excl. end of year examination weeks); approximately how many student contact hours will/did your ${q://QID331/ChoiceGroup/SelectedChoices} require?

Over how many weeks of the year would your ${q://QID331/ChoiceGroup/SelectedChoices} student contact hours ideally be distributed?

Comment on any aspect of the timetabled student contact hours or their distribution over the school year.

**SWM Framework Review**

## 3. Review of the SWM framework Domains

**The next four pages review the main elements of the SWM framework as established so far from the first two Delphi rounds and the pre-round 3 panellist interviews.**

**Following the review you can choose the *Anchoring* Subdomain for your ${q://QID331/ChoiceGroup/SelectedChoices}.**

***Connected* subdomains for your ${q://QID331/ChoiceGroup/SelectedChoices} can also be selected at a later point in the questionnaire.**

Read the review OR Skip straight to the Subdomain choices?

○ I want to Review the SWM framework elements ○ Skip the Review

### The three SWM Domains

**ECOSPHERE**
Humanity's relationship with its planetary, ecological, and built environment.

**GLOBAL JUSTICE**
Humanity's world of community, social, and political relationships.

**CULTURAL VISION**
Humanity's relationship with its cultural histories, its present, and its future.

### Each Domain has three Subdomains

The basis of the three **ECOSPHERE** subdomains is spatial.

- **Maker-Recyclers** are responsible for human-built and physically modified environments.
- **Regenerative-Cultivators** manage human-occupied land and water ecosystems for human sustenance in ways that improve their wellbeing and ours.
- **Kaitiaki Custodians (provisional**)** look out toward, explore, and seek alignment with more than human nature. They are conscious of being part of nature and of our duty of care toward and need of respect for it.

** There is a question later in the survey about alternatives for this subdomain title

## The basis of the three **GLOBAL JUSTICE** subdomains is the structure of human relationships across all social scales from interpersonal to global.

- **Whanau and Community** is concerned with respectful, face to face relationships of mutual physical, emotional and inter-generational support.
- **Equity, Rights and Responsibilities** is concerned with equity, balance, and reciprocity. The collective strength of mutual wellbeing awareness within and between communities and nations.
- **Power and Influence** deals with humanities struggle to avoid catastrophic conflict and govern itself for the collective determination of an ecologically sustainable world order which includes mutually beneficial relationships with all other species.

## The subdomains of **CULTURAL VISION** are time-based.

- **Our cultural inheritance** seeks to learn from the triumphs and tragedies of our own culture's past that have led to our collective present, crucial lessons for the sustainable wellbeing of future generations.
- **Others' cultures and World views** cultivates an appreciation of the enriching and empowering diversity of world-views in our own time, and the realisation that cultures can be more or less well adapted to their natural environments, and no world-view can be final.
- **Cultural evolution and Individual agency** is about the power of the individual to influence history and the collective's need to foster individuality. It is future-focused on the challenge of creating new connected coherent visions of humanities' direction equal to the present Sustainable Wellbeing crisis we face.

Anchoring Subdomain Choice

**4. ${q://QID331/ChoiceGroup/SelectedChoices} Anchoring Subdomain, Title, Context, Year levels, etc.**

What is the Anchoring Subdomain for your ${q://QID331/ChoiceGroup/SelectedChoices}?

| Ecosphere | Global Justice | Cultural Vision |
|---|---|---|
| ○ Maker-Recyclers | ○ Whanau and Community | ○ Our cultural inheritance |
| ○ Regenerative-Cultivators | ○ Equity, Rights, and Responsibilities | ○ Others' cultures and World views |
| ○ Kaitiaki Custodians (provisional) | ○ Power and Influence | ○ Cultural evolution and Individual agency |

**Kaitiaki Custodians** is provisional because a later question asks for feedback on other options for this subdomain title.

Title, history, & Year levels

**${lm://Field/1} ${q://QID331/ChoiceGroup/SelectedChoices} Title, Context, and Setting**

What is the title of this ${lm://Field/1} ${q://QID331/ChoiceGroup/SelectedChoices}?

Please briefly describe the school/community/environmental context and Setting for your Sustainable Wellbeing ${q://QID331/ChoiceGroup/SelectedChoices}.

This ${q://QID331/ChoiceGroup/SelectedChoices} is one that ...
(select all that apply)

- [ ] I hope to be teaching in future years
- [ ] I'm scheduled to teach in 2022
- [ ] I have previously taught

In which year did you last teach this ${q://QID331/ChoiceGroup/SelectedChoices}?

This ${q://QID331/ChoiceGroup/SelectedChoices} ...

- ○ is designed for a specific year level
- ○ could be adapted to two or any of years 11, 12, or 13
- ○ is designed for simultaneous multi-year level groups of years 11 to 13 students

is designed for ...

| Year 11 | Year 12 | Year 13 |
|---|---|---|
| ○ | ○ | ○ |

please select the year levels it could be adapted to

| Year 11 | Year 12 | Year 13 |
|---|---|---|
| ☐ | ☐ | ☐ |

please select the year levels it will include

| Year 11 | Year 12 | Year 13 |
|---|---|---|
| ☐ | ☐ | ☐ |

## Collaborators and their Expertise

### 5. ${q://QID331/ChoiceGroup/SelectedChoices} Collaborators and Expertise

How many other **teachers from your school** would you ideally want to be, or were you, collaborating with in this ${q://QID331/ChoiceGroup/SelectedChoices} ?

None ○

One ○

Two ○

Three ○

Four ○

Five ○

Other (specify) [ ] ○

Select the Learning Areas expertise which those teachers will ideally have to collaborate in the ${lm://Field/1} ${q://QID331/ChoiceGroup/SelectedChoices}: ${q://QID274/ChoiceTextEntryValue}

- ☐ English
- ☐ Health & PE
- ☐ Mathematics & Statistics
- ☐ Social Sciences
- ☐ The Arts
- ☐ Learning Languages
- ☐ Science
- ☐ Technology

Comment on Other teachers' ideal Learning Areas particular expertise, ideal roles in, and availability for this ${q://QID331/ChoiceGroup/SelectedChoices} .

How many collaborators **other than teachers from your school** would you ideally want to be involved with you in this ${q://QID331/ChoiceGroup/SelectedChoices} ?
(E.g. Tertiary Institute staff, EfS organisation staff, Local business or Trades people, Parent Community, senior students, ... etc.)

None

One

Two

Three

Four

Five

Other (specify)

Comment on other ideal collaborators, their availability, affiliations, expertise, and intended roles in this ${q://QID331/ChoiceGroup/SelectedChoices}.

**Anchor Subdomain Specific SWG**

## 6. ${q://QID331/ChoiceGroup/SelectedChoices} Sustainable Wellbeing Goals (SWG)

### In this section you can choose ...

- The SWG(s) for your ${q://QID331/ChoiceGroup/SelectedChoices}'s Anchoring ${q://QID267/ChoiceGroup/Sel

subdomain, as well as

- SWG(s) from other subdomains of the framework you see as *Connected* in a significant way with your ${q://QID331/ChoiceGroup/SelectedChoices},
- SWGs related to the UN Sustainable Development Agenda, and
- Write your own Place and Content based goals (PCBG, up to 5)

**For each type of Goal you choose or write here there is a corresponding question in section 10 on its Assessment.**

Select the **Maker-Recyclers** subdomain specific Sustainable Wellbeing Goal(s) that most closely describe what you want your students to achieve in this ${q://QID331/ChoiceGroup/SelectedChoices}

- [ ] Understand the concept of circular economy and its climate-biodiversity basis, and collaborate to practise and develop zero-emissions and zero-waste technologies in your school and community.
- [ ] Explore, share, and build energy use reduction, efficiency, and renewable generation solutions in your school and community.
- [ ] Explore, Share, and develop the skills to imagine, design, and build sustainable technologies including, Eco-housing/cities, Eco-transport, Eco-clothing and Eco-communication infrastructure for Aotearoa New Zealand.

Select the **Regenerative-Cultivators** subdomain specific Sustainable Wellbeing Goal(s) that most closely describe what you want your students to achieve in this ${q://QID331/ChoiceGroup/SelectedChoices}.

- [ ] Understand the climate-environmental necessity for sustainable resources management principles and participate in the regeneration of an abundant cultivated, ecosystem: For example; Fisheries, Aquaculture, Agriculture, Horticulture, Forestry, etc.
- [ ] Understand, share, and explore, our ecologically dependent place in the inter-species web of life across all scales from local to global.
- [ ] Develop co-operative, hands-on cultivation and eco-friendly sustainable resource management skills using low or high-tech methods as appropriate: For example, through participation in an ongoing school or community garden, or farm.

Select the **Kaitiaki Custodians (provisional)** subdomain specific Sustainable Wellbeing Goal(s) that most closely describe what you want your students to achieve in this ${q://QID331/ChoiceGroup/SelectedChoices}.

- [ ] Understand the long history of Earth's evolution and explore our relationship to wild ecosystems through observational and survival skills education in, and outside the classroom.

## *C-2.2 Delphi Survey 3: p. 13 to 14 Evaluating the Subdomain Sustainable Wellbeing Goals*



${q://QID331/ChoiceGroup/SelectedChoices}.

- ☐ Understand the power of Individuals to influence the course of history and the role of societies in fostering the unique gifts of all their members. Explore and express your aspirations and dreams according to your vision of our collective future.
- ☐ Imagine, design and Innovate for a unified ecologically conscious world culture that celebrates diversity and is centred on achieving sustainable planetary wellbeing by facing our changing climate, social, and cultural challenges.
- ☐ Investigate human challenges and envision possibilities in a world of ever-increasing technological sophistication. Investigation possibilities include the implications for the meaning of freedom, free speech, self-determination, privacy, the practice of mindfulness, creativity, and problem-solving, including pollution, biodiversity loss, and climate change.
- ☐ Explore and navigate personal, social and cultural identities (e.g. urban vs rural, LGBTQ+, generational, etc.) and how they relate to futures of sustainable wellbeing.

The Sustainable Wellbeing Goal(s) (SWG) that I chose on the previous page accurately describe(s) key aspects of what I want students to achieve in this ${q://QID331/ChoiceGroup/SelectedChoices}.

- Strongly disagree ○
- Somewhat disagree ○
- Neither agree nor disagree ○
- Somewhat agree ○
- Strongly agree ○

**Connected_Subdomain_Choices**

With which (if any) of the other SWM Subdomains is your ${q://QID331/ChoiceGroup/SelectedChoices} ***Connected***?

(Choose as many other C*onnected* subdomains as you intend to set Sustainable Wellbeing Goals for).

- [ ] » **Maker-Recyclers**
- [ ] » **Whanau and Community**
- [ ] » **Our cultural inheritance**
- [ ] » **Regenerative-Cultivators**
- [ ] » **Equity, Rights, and Responsibilities**
- [ ] » **Others' cultures and World views**
- [ ] » **Kaitiaki Custodians (provisional)**
- [ ] » **Power and Influence**
- [ ] » **Cultural evolution and Individual agency**

**Connected_Subdomains_SWGs**

Select SWGs for your ${q://QID331/ChoiceGroup/SelectedChoices} from the **Maker-Recyclers** Connected Subdomain [select all that apply].

- [ ] Understand the concept of circular economy and its climate-biodiversity basis, and collaborate to practise and develop zero-emissions and zero-waste technologies in your school and community.
- [ ] Explore, share, and build energy use reduction, efficiency, and renewable generation solutions in your school and community.
- [ ] Explore, Share, and develop the skills to imagine, design, and build sustainable technologies including, Eco-housing/cities, Eco-transport, Eco-clothing and Eco-communication infrastructure for Aotearoa New Zealand.

Select SWGs for your ${q://QID331/ChoiceGroup/SelectedChoices} from the **Regenerative-Cultivators** Connected Subdomain, [select all that apply].

- [ ] Understand the climate-environmental necessity for sustainable resources management principles and participate in the regeneration of an abundant cultivated, ecosystem: For example; Fisheries, Aquaculture, Agriculture, Horticulture, Forestry, etc.
- [ ] Understand, share, and explore, our ecologically dependent place in the inter-species web of life across all scales from local to global.
- [ ] Develop co-operative, hands-on cultivation and eco-friendly sustainable resource management skills using low or high-tech methods as appropriate: For example, through participation in an ongoing school or community garden, or farm.

## *C-2.3 Delphi Survey 3: p. 17 to 21 Selecting United Nations Sustainable Development Goals*



Select SWGs for your ${q://QID331/ChoiceGroup/SelectedChoices} from the **Cultural evolution and Individual agency** Connected Subdomain, [select all that apply].

- [ ] Understand the power of Individuals to influence the course of history and the role of societies in fostering the unique gifts of all their members. Explore and express your aspirations and dreams according to your vision of our collective future.
- [ ] Imagine, design and Innovate for a unified ecologically conscious world culture that celebrates diversity and is centred on achieving sustainable planetary wellbeing by facing our changing climate, social, and cultural challenges.
- [ ] Investigate human challenges and envision possibilities in a world of ever-increasing technological sophistication. Investigation possibilities include the implications for the meaning of freedom, free speech, self-determination, privacy, the practice of mindfulness, creativity, and problem-solving, including pollution, biodiversity loss, and climate change.
- [ ] Explore and navigate personal, social and cultural identities (e.g. urban vs rural, LGBTQ+, generational, etc.) and how they relate to futures of sustainable wellbeing.

**SWG related to the UN Sustainable Development Goals**

**Listed below are the 17 UN Sustainable Development Goals (SDG).**

Which (if any) of these 17 SDGs might you ask your students to, Investigate, critique**, and take action in relation to, as part of your ${q://QID331/ChoiceGroup/SelectedChoices} "${q://QID274/ChoiceTextEntryValue}"?

(** "critique" could be, for instance, of potential contradictions amongst selected SDGs, Or of progress toward achieving these goals, globally or locally)

- [ ] · SDG 1: End poverty in all its forms everywhere
- [ ] · SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
- [ ] · SDG 3: Ensure healthy lives and promote well-being for all at all ages.
- [ ] · SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
- [ ] · SDG 5: Achieve gender equality and empower all women and girls.
- [ ] · SDG 6: Ensure availability and sustainable management of water and sanitation for all.
- [ ] · SDG 7: Ensure access to affordable, reliable, sustainable, and modern energy for all.
- [ ] · SDG 8: Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.
- [ ] · SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.
- [ ] · SDG 10: Reduce inequality within and among countries.

- [ ] · SDG 11: Make cities and human settlements inclusive, safe, resilient, and sustainable.
- [ ] · SDG 12: Ensure sustainable consumption and production patterns.
- [ ] · SDG 13: Take urgent action to combat climate change and its impacts.
- [ ] · SDG 14: Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.
- [ ] · SDG 15: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
- [ ] · SDG 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable, and inclusive institutions at all levels.
- [ ] · SDG 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

Place_Based_Goals

## Place and Content Based Goals

- An example of a Placed Based Goal could be:
  *Monitor, the health of our estuary mangrove ecosystem, understand its importance for climate change adpatation, and advocate for its preservation.*
- An example of a Content Based Goal would be knowledge, issues, or big ideas you judge relevant to this ${q://QID331/ChoiceGroup/SelectedChoices} which are not currently included in any Learning Area Achievement Objectives of the NZC,
  - *such as Fractal Geometry or Non-linear Systems Computational modelling in mathematics*
    OR
  - *the Economic implications of Climate change.*
    (Level 5 Social Studies includes the Achievement "Understand how economic decisions impact on people, communities, and nations". In the levels 6 to 8 Economics achievement objectives, however, market failure and equitable outcomes are mentioned but the planetary limits on economic growth are not).

**How many (if any) of your own Place or Content Based Goals (PCBG) would you like to define for this ${q://QID331/ChoiceGroup/SelectedChoices}?**

0

What **local Place Based** or **Content Based Sustainable Wellbeing Goal(s)** (PCBG) are you setting for your ${lm://Field/1} subdomain ${q://QID331/ChoiceGroup/SelectedChoices} : **${q://QID274/ChoiceTextEntryValue}**?

(NB: Interpersonal and Intrapersonal competency goals, and NZC Learning Area Achievement Objectives come in later questions).

| | |
|---|---|
| PCBG 1 | |
| PCBG 2 | |
| PCBG 3 | |
| PCBG 4 | |
| PCBG 5 | |

Assign each of your Place Based Goals to the SWM subdomain it best fits (choose from the drop down menus).

| | |
|---|---|
| » PCBG 1 | |
| » PCBG 2 | |
| » PCBG 3 | |
| » PCBG 4 | |
| » PCBG 5 | |

**Pedagogy, EOtC, and Student Agency**

### 7. Pedagogical strategies, EoTC, Resources, Student Agency, and Products

What are some of the key pedagocial strategies you will use in this ${q://QID331/ChoiceGroup/SelectedChoices}?

Will Education Outside the Classroom be important in this ${q://QID331/ChoiceGroup/SelectedChoices} and if so, how?

Will student initiative and agency be important in this ${q://QID331/ChoiceGroup/SelectedChoices} and if so, how?

**Resources and products**

What resources will be important in achieving the goals of this ${q://QID331/ChoiceGroup/SelectedChoices}?

What tangible, performance, or virtual products will the students be asked to produce during this ${q://QID331/ChoiceGroup/SelectedChoices}?

**Student Competencies to be Developed**

**8. Student Competencies to be prioritised in this ${q://QID331/ChoiceGroup/SelectedChoices}**

**... across a range of everyday as well as challenging, nature-physical, social-emotional, and cultural-mental health situations, at three interrelated levels:**

- **Taha Whanau Interpersonal** (Action, Feeling, and Thinking)
- **Individual Intrapersonal** (Action, Feeling, and Thinking)
- **Integrating Self** (Total, Taha Whanau Interpersonal, and Individual Intrapersonal)

Choose one of three possible options for each competence: "not a priority [the deault]", "important for some students", "important for All students".

- There are also options to add your own competency statements in each level.
- This section comprises 12 pages.
- For each type of Competency you prioritise here there is a corresponding question in section 10 on its Assessment.

Do you want to select competencies to be prioritised in this ${q://QID331/ChoiceGroup/SelectedChoices}, OR Skip straight to the NZC Achievement Objectives section?

Select Competencies

Skip to Achievement Objectives

The next four pages allow you to prioritise SWM framework Wellbeing Competencies or (on the fourth page) to define your own, in each of the three
**Taha whanau-Interpersonal level Domains:**

- **Collaborative Action**
- **Collaborative Feeling**
- **Collaborative Thinking**

... for your students to develop through their participation in your ${q://QID331/ChoiceGroup/SelectedChoices}: **${q://QID274/ChoiceTextEntryValue}**

Skills, competencies, and dispositions to be developed through this ${q://QID331/ChoiceGroup/SelectedChoices} in the **Interpersonal Action** Domain.

| | Important for All or Most Students | Important for some students | Not a prio ${q://QID331/ChoiceGr |
|---|---|---|---|
| **Action Competencies** | | | |
| **Awareness of and support for the physical wellbeing of others. E.g. Reducing Community carbon footprint** | ○ | ○ | ○ |
| **Developing Eco-Trades, resource management and nature conservation skills** | ○ | ○ | ○ |
| **Developing empathy for the environment and other species through experiences in nature** | ○ | ○ | ○ |
| Planning and conducting collaborative sustainable wellbeing projects and observations outside the classroom | ○ | ○ | ○ |

Skills, competencies, and dispositions to be developed through this ${q://QID331/ChoiceGroup/SelectedChoices} in the **Interpersonal Feeling** Domain.

| | Important for All or Most Students | Important for some students | Not a prio ${q://QID331/ChoiceGr |
|---|---|---|---|
| **Feeling Competencies** | | | |
| **Socio-emotional engagement, perspective, and learning. E.g. framing issues as solvable, collaborative artistic expression** | ○ | ○ | ○ |

## *C-2.4 Delphi Survey 3: p. 26 to 27 Selecting New Zealand Curriculum Curriculum Objectives*



Define your own Integrating-Self Competency(ies)

Level & Learning Area Selection

### 9. New Zealand Curriculum Achievement Objectives

In this section you can Prioitise the NZC Achievement Objectives that you consider essential for or supportively linked to the SW Goals and local PB Goals of this ${q://QID331/ChoiceGroup/SelectedChoices}: **${q://QID274/ChoiceTextEntryValue}**

- Click on as many of the level-learning Areas buttons below that are likely to be relevant then ...
- use the sidebar table of contents to navigate to the pages where you can choose particular objectives to prioritise for your ${q://QID331/ChoiceGroup/SelectedChoices}.
- You can use the ***Forward Arrow*** at the bottom of the page to progress through the learning-learning areas you chose BUT, do not click foward from the final page chosen for a level until you are ready to finish with that level.
- You can return to this selection page using the sidebar to click on any level-learning areas to visit, until you choose to ***Complete*** the Achievement Objectives section by using the ***Forward Arrow*** to leave your last chosen level-learning area.

| | | | |
|---|---|---|---|
| ☐ Level Five English | ☐ Level Six English | ☐ Level Seven English | ☐ Level Eight English |
| ☐ **Level Five Arts** | ☐ **Level Six Arts** | ☐ **Level Seven Arts** | ☐ **Level Eight Arts** |
| ☐ Level Five Health & PE | ☐ Level Six Health & PE | ☐ Level Seven Health & PE | ☐ Level Eight Health & PE |
| ☐ **Level Five Learning Languages** | ☐ **Level Six Learning Languages** | ☐ **Level Seven Learning Languages** | ☐ **Level Eight Learning Languages** |
| ☐ Level Five Mathematics & Statistics | ☐ Level Six Mathematics & Statistics | ☐ Level Seven Mathematics & Statistics | ☐ Level Eight Mathematics & Statistics |
| ☐ Level Five Science | ☐ Level Six Science | ☐ Level Seven Science | ☐ Level Eight Science |
| ☐ Level Five Social Sciences | ☐ Level Six Social Sciences | ☐ Level Seven Social Sciences | ☐ Level Eight Social Sciences |

☐ Level Five Technology ☐ Level Six Technology ☐ Level Seven Technology ☐ Level Eight Technology

## Level Five

The Achievement Objectives you want to see must be selected on the NZC Learning Area Selection page before they will appear here.

**NZC Level Five English Achievement Objectives (p1 of 2) for your ${q://QID331/ChoiceGroup/SelectedChoices}:**

${q://QID274/ChoiceTextEntryValue}

| | Essential | Useful | Not a priority |
|---|---|---|---|
| **Listening, reading, and viewing. Students will:** | | | |
| Integrate sources of information, processes, and strategies purposefully and confidently to identify, form, and express increasingly sophisticated ideas. | ○ | ○ | ○ |
| **By using these processes and strategies when speaking, writing, or presenting, students will:** | | | |
| Show an understanding of how texts are shaped for different purposes and audiences. | ○ | ○ | ○ |
| Show an understanding of ideas within, across, and beyond texts. | ○ | ○ | ○ |
| Show an understanding of how language features are used for effect within and across texts. | ○ | ○ | ○ |
| Show an understanding of a range of structures. | ○ | ○ | ○ |

**NZC Level Five English Achievement Objectives (p2 of 2) for your ${q://QID331/ChoiceGroup/SelectedChoices}:**

${q://QID274/ChoiceTextEntryValue}

| | Essential | Useful | Not a priority |
|---|---|---|---|
| **Speaking, writing, and presenting. Students will:** | | | |
| Integrate sources of information, processes, and strategies purposefully and confidently to identify, form, and express increasingly sophisticated ideas. | ○ | ○ | ○ |
| **By using these processes and strategies when speaking, writing, or presenting, students will:** | | | |
| Show an understanding of how to shape texts for different audiences and purposes. | ○ | ○ | ○ |
| Select, develop, and communicate purposeful ideas on a range of topics. | ○ | ○ | ○ |
| Select and use a range of language features appropriately, showing an understanding of their effects. | ○ | ○ | ○ |
| Organise texts, using a range of appropriate, effective structures. | ○ | ○ | ○ |

## *C-2.5 Delphi Survey 3: p. 76 to 77 Selecting National Certificate of Educational Achievement Standards*



| | Essential | Useful | Not a priority |
|---|---|---|---|
| **Technological modelling**: Understand the role of technological modelling as a key part of technological development, justifying its importance on moral, ethical, sustainable, cultural, political, economic, and historical grounds. | ○ | ○ | ○ |
| **Technological products**: Understand the concepts and processes employed in materials development and evaluation and the implications of these for design, development, maintenance, and disposal of technological products. | ○ | ○ | ○ |
| **Technological systems**: Understand operational parameters and their role in the design, development, and maintenance of technological systems. | ○ | ○ | ○ |
| **Characteristics of technology**: Understand the implications of technology as intervention by design and how interventions have consequences, known and unknown, intended and unintended. | ○ | ○ | ○ |
| **Characteristics of technological outcomes**: Understand how technological outcomes can be interpreted and justified as fit for purpose in their historical, cultural, social, and geographical locations. | ○ | ○ | ○ |

**NCEA Standards**

### 10. NCEA and Other Assessment & Accreditation options

In this Section you are first asked to nominate current NCEA standards which you could, or have used, to accredit particular elements of student achievement in your ${q://QID331/ChoiceGroup/SelectedChoices}:
**${q://QID274/ChoiceTextEntryValue}**.

The standards are to be listed in three career pathway related groups; 'All Students', 'Vocational', and 'Academic'.
There are four steps in this section:

1. Choose how many standards (up to 10) you will list for each pathway. (This can be changed later *in this section* using the back button)
2. List the standards using any unique identifier (NZQA number preferably, MoE identifier e.g. English AS1.1, or Title)
3. Classify the standards by where they will be assessed, EITHER '**Essential within this ${q://QID331/ChoiceGroup/SelectedChoices}**' OR '**Could be Shared with other Projects/Courses**'
4. Evaluate and comment on the proposed new NCEA RAS standards

How many Standards are you listing for 'All Students'?

0

How many Standards are you listing for All or Some 'Vocational Students'?

0

How many Standards are you listing for All or Some 'Academic Students'?

0

List the ${q://QID346/ChoiceTextEntryValue} standards for **All Students**

| | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |

List the ${q://QID347/ChoiceTextEntryValue} standards for **Vocational Students**

| | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |

List the ${q://QID348/ChoiceTextEntryValue} standards for **Academic Students**

| | |
|---|---|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |

*C-2.6 Delphi Survey 3: p. 80 to 81 Commenting on the government's NCEA Review of Achievement Standards process*



## NCEA Review of Achievement Standards (RAS)

The government's **NCEA RAS** proposes (amongst other things) to reduce the number of Achievement Standards and increase their scope.

The **new NCEA RAS** standards will improve my and my colleagues ability to assess and accredit student achievement for this Sustainable Wellbeing ${q://QID331/ChoiceGroup/SelectedChoices}.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Comment on your response above and the proposed new NCEA RAS standards

**Other Assessment Methods Choice**

## Assessment Methods for *Competency* Goals, Other than existing NCEA standards

Competency goals for SWM Inter & Intra Personal domains [Action, Feeling, Thinking, and Self-Integration], cannot always be assessed and accredited using current NCEA Standards.

Would you like to describe Assessment Methods Other than existing NCEA standards that you or your teaching team might use to assess and accredit any of the SWM *Competency* goals you have selected above?

| No | Yes |
|---|---|
| ○ | ○ |

**Other Assessment Methods**

### Assessment Methods Other than NCEA

Thinking all of the Competency goals you have set above for the SWM Inter & Intra Personal domains [Action, Feeling, Thinking, and Self-Integration],
How many Assessment Methods (formative or summative), (Other than NCEA standards that you are Aware of), did or might you or your teaching team use in this ${q://QID331/ChoiceGroup/SelectedChoices} to decide how well students achieved or will achieve those goals? [You can describe up to 8 on the next page, including proposing new NCEA standards. At least One must be defined].

1

Please write a brief descriptor for each of these Other Assessment Methods

| | |
|---|---|
| Method 1 | |
| Method 2 | |
| Method 3 | |
| Method 4 | |
| Method 5 | |
| Method 6 | |
| Method 7 | |
| Method 8 | |

Comment on your Other Assessment Methods?

### Assessment Methods Other than NCEA

Would you like to show how you would assess the Action, Feeling, Thinking, and Self-Integration competencies you selected above, using the list of methods you have described above?

*C-2.7 Delphi Survey 3: p. 110 to 111 Bringing it All Together*



| | Can be assessed with available NCEA standards | Asse |
|---|---|---|
| » Explore and navigate personal, social and cultural identities (e.g. urban vs rural, LGBTQ+, generational, etc.) and how they relate to futures of sustainable wellbeing. | | |

**Bringing it All Together**

**Bringing it All Together**

At the completion of this ${q://QID331/ChoiceGroup/SelectedChoices}:
*${q://QID274/ChoiceTextEntryValue}*
students should be able to demonstrate a critical appraisal and understanding of how the ${q://QID331/ChoiceGroup/SelectedChoices} Goals and Subject based Achievement Objectives and NCEA standards all combine and contribute toward the central Goal of a Future of Sustainable Wellbeing. That appraisal and understanding should be supported by an emotional preparedness to judge the significance of the issues involved for humanity, their community and themselves, and by a commitment to appropriate purposeful action.

Strongly disagree ○

Somewhat disagree ○

Neither agree nor disagree ○

Somewhat agree ○

Strongly agree ○

**New NCEA Achievement standards for the SWM subdomains?**

A new NCEA Achievement standard written specifically to match the Intent of the ${q://QID267/ChoiceGroup/SelectedChoices} subdomain in which this ${q://QID331/ChoiceGroup/SelectedChoices} is set would be an effective way of accrediting Aotearoa New Zealand students ability to demonstrate these capabilities for integrated thought, balanced judgement, and agency toward a future of Sustainable Wellbeing for humanity, their community and themselves.

- Strongly disagree
- Somewhat disagree
- Neither agree nor disagree
- Somewhat agree
- Strongly agree

Comment on your responses to these 'Bringing it All Together' statements

**Document Uploads**

## 11. Document Uploads

On this page you can Upload up to three planning or assessment documents related to your ${q://QID331/ChoiceGroup/SelectedChoices}: **${q://QID274/ChoiceTextEntryValue}**

Comment on any of your uploaded documents

Document 1

*C-2.8 Delphi Survey 3: p. 113 to 114 Overall Rating of the Sustainable Wellbeing Metacurriculum (SWM) framework and Survey Experience*



Rate the overall usefulness of the Sustainable Wellbeing Metacurriculum framework for ${q://QID331/ChoiceGroup/SelectedChoices} planning based on your experience with this SWM Delphi round 3 questionnaire.

- Poor
- Fair
- Good
- Very Good
- Excellent

Comment on the rating you've given above. How could it be improved?

**Survey Experience**

**14. Survey Experience**

Please add here any suggestions, comments, or questions regarding any aspect of this research project to date?

The time I spent completing this survey was:

- much less than I expected
- less than I expected

about what I expected

○

more than I expected

○

much more than I expected

○

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## C-3 Sustainable Wellbeing Metacurriculum (SWM) Unit Contexts

### *C-3.1 Appendix Section Outline*

This section presents the full case study vignettes summarised in Section 5.3. These vignettes explore the nine Core Participants' perspectives on their teaching for Sustainable Wellbeing within their whole school contexts.

The summaries are presented under the teachers' names and the titles of the SWM Units they outlined for this study in the order they appear in Table 5-2. Anita provided two SWM Units, hence the ten case studies. As explained in Section 5.1, Brent did not provide an SWM Unit outline for years 11 to 13 students but did offer crucial reflections on the SWM framework and the challenges of cross-curricular, sustainability and wellbeing-centred education at this level of schooling, from his perspective as an Associate Principal of a large, urban Mainstream Secondary school. Brent's description of his school's cross-curricular 'Innovation Stream' curriculum for years 9 and 10 and his reflections on the SWM framework are presented in Section 5.3.11.

### *C-3.2 Mathew—Business Studies Level 2*

The learning goals of 'Business Studies - Level 2' need to be understood in the wider context of the faith-based values of this Catholic school which have many intersections with the values that underpin the SWM framework. Three of the fourteen items in the school's year 13 graduate profile are particularly resonant. The year 13 Course Booklet states:

> We aim, by modelling, for our graduates to be:
> - Compassionate individuals who … Promote social justice for all, especially the, most poor and vulnerable in society; …
> - Committed learners who [can] set goals and work towards, achieving them, are resilient and independent with a ' can-do' attitude; …
> - Community-focused individuals who actively promote stewardship of the Earth for the good of all.

While 'Business Studies Level 2' has a strong sustainability-oriented cross-curricular component it is not typical of the curriculum for year 11 to 13 students at this year 7 to 15 co-ed secondary school. There is, however, a strong cross-curricular ethos underpinning the curriculum in the earlier years. Year 7 to 10 students select a programme of six modules in each half-year semester some of which pair subjects from different learning areas. In years nine and ten for example, the module 'Energy In, Energy Out' pairs Technology (Food) with Health and Physical Education; 'Superbugs' pairs Science with Social science; 'Superhumans' pairs Science with Health and Physical Education; and 'On Stage' pairs Arts with Technology. Strong sustainability and wellbeing themes are apparent in many of these modules, e.g. 'Survival of the Fittest' which pairs Health and Physical Education with Social Science asks the students to "Inquire into the geography of Lake Waikaremoana and understand why Lake Waikaremoana has been given the legal status of a person.". The subjects, Mathematics, English, Languages and Religious Education are taught in traditional single-subject modules. In addition to their selection of subject-based modules, students are also required to undertake one 'Impact Project' each semester.

The Impact Project lesson times occur on Fridays for all students from year 7 to year 13 in two 100-minute blocks on either side of lunchtime. Some projects are student-led and others teacher-led. In

years 7 to 10, the projects are organised under seven ‘umbrella’ themes which are arranged in two groups. There are three ‘focus umbrella’ themes, so named because they most closely align with the goals of the school’s graduate profile. They are:

- Stewardship of our Earth
- Care for others, and
- Build my own project.

These focus themes have much in common with the SWM subdomains of ‘Kaitiaki Guardians’, ‘Whanau and Community’, and ‘Maker-Recyclers’. The remaining umbrella themes are subject-oriented. They are:

- Performing Arts
- Sports.
- Sciences, and
- Design, Arts & Technology

For the senior school, there are thirty-five project themes suggested in the school document titled ‘2022 Course and Project Selections for Students in Years 11, 12 and 13’. All thirty-five are linked to a specific traditional subject with the umbrella focus themes mentioned above listed under Religious Education. The students can choose whether they incorporate assessment for National Certificate of Educational Achievement (NCEA) credits or not within their Impact Projects. Forty percent of the year 11 to 13 students choose the ‘Gateway’ option for their Friday project. ‘Gateway’ means attending vocationally directed courses at the local tertiary technical institute, Mathew informed me. There “ … they'll do things like automotive or Sport and Rec, whatever it might be with the idea of possibly getting a job or future employment in those fields.” For the remaining 60% of senior students, the impact projects provide an opportunity to exercise agency in pursuing a project of their choosing which may or may not have a Sustainable Wellbeing orientation.

Figure C-1 shows the years 11-13 weekly timetable for Mathews’ school. The Friday Impact Projects time, coloured green amounts to 3 hours and 20 minutes per week and represents 13% of the students’ total lesson time. The formal subject-based lesson blocks, coloured yellow comprise 20 hours per week, 81% of the total and the pastoral/administrative blocks labelled VTF (for Vertical Form Time) coloured darker blue are 6% of the total. The end-of-day 20-minute blocks labelled WRO (for Warning Report Out), coloured light blue are also pastoral care time but are reserved for students who have had misdemeanours during the day that need to be addressed through a restorative justice meeting between the student and the teacher(s) involved.

The alignments between the school’s Religious Education noted already in the impact projects’ umbrella focus themes are apparent also in the formal subject-based lessons’ Religious Education courses which every student is required to take as one of their five or six NCEA subjects. In Table C-1 I show how the content and goals of the course ‘Religious Education-Level 2’ at Mathew's school as defined in the school’s ‘Year 12 course booklet 2022’, align with the Social Justice, Cultural Vision, and Integrating-Self Domains and subdomains of the SWM framework.

*Figure C-1 Weekly timetable template for year 11 to 13 at Mathew's school*

| Monday | Tuesday | Wednesday | Thursday | Friday |
|---|---|---|---|---|
| 08:30 VFT | 08:30 VFT | VFT | VFT | |
| 08:40 Block 1 | 08:40 Block 1 | Block 1 | Block 1 | Late start |
| 09:30 Block 2 | | | | 09:30 VFT |
| | 09:55 Interval | Interval | Interval | 09:40 Block 1 Wellbeing |
| 10:20 Interval | 10:15 Block 2 | Block 2 | Block 2 | 10:20 Interval |
| 10:40 Block 3 | | | | 10:40 Block 2 Friday Project |
| 11:30 Block 4 | 11:30 Block 3 | Block 3 | Block 3 | |
| 12:20 Lunch | 12:45 Lunch | Lunch | Lunch | 12:20 Lunch |
| 13:10 Block 5 | 13:35 Block 4 | Block 4 | Block 4 | 13:10 Block 3 Friday Project |
| 14:00 Block 6 | | | | |
| 14:50-15:10 WRO | 14:50-15:10 WRO | WRO | WRO | 14:50-15:10 WRO |

In the years 11-13 Monday through Thursday timetable, Sustainable Wellbeing themes might also be integrated into the traditional secular subject-based lessons as they are in 'Business Studies level 2'. The 2022 year 12 and 13 course booklets for instance mention sustainability explicitly in the Textiles Technology–Level 2, Geography–Level 2, And Geography–Level 3 courses, but the Education for Sustainability standards are not included in any course. Cross-curricular team teaching is common in the junior school and all but one teacher on the staff in 2021 was teaching one or more junior classes. Team teaching was not practiced however in the senior school. Mathew explained that the introduction of team-taught cross-curricular modules in the junior school was a relatively recent innovation for the school to which teachers were still adapting. When I asked if the SWM framework as proposed might help teachers to rethink their subject content priorities to overcome the over-crowded curriculum problem, he replied:

> I think our teachers already had a fair bit, of that. They've changed from teaching in a single-cell classroom to maybe a team of two or three, going through modules and that sort of stuff. And even our senior teachers who come and teach in the

> junior classes, they've been through that process as well. …so not in those senior classes they're not team teaching. there's only one staff member currently teaching solely senior classes. [But], the others are all having a go. Seeing what it's like.

*Table C-1 Alignment between the content and goals of the course 'Religious Education-Level 2' in Mathew's school and the SWM framework Domains. The SWM level codes H and I refer to the 'Human & Societal' and the 'Inter & Intra personal' levels of the framework, respectively.*

| **Religious Education–Level 2** | **SWM Framework** | | |
|---|---|---|---|
| **Content: This subject covers the following topics:** | **Level** | **SWM Domain** | **Subdomain** |
| Loss, Death and Grief | H | Cultural Vision | Cultural Evolution and Individual Agency |
| | I | Integrating Self | Intrapersonal |
| Social Justice. | H | Social Justice. | [All three subdomains] |
| Changes in a Religious Tradition. | H | Cultural Vision | Others' Cultures and World Views |
| **Students will have the opportunity to reflect on:** | | | |
| Their own spiritual journey while examining the significance of a key belief within two religious traditions. | H | Cultural Vision | Others' Cultures and World Views |
| | I | Integrating Self | Intrapersonal |
| Developing an appreciation of Catholic social teaching in response to an issue of justice. | H | Cultural Vision | Our Cultural Inheritance |
| The ways in which the Catholic Church has developed over the years and the wider implications of these changes. | H | Cultural Vision | Our Cultural Inheritance |

Community service is an important aspect of Impact projects. Students can be involved in both cultural development and environmental action projects. The school has a native reserve of 0.75 ha which was planted in 2014 to restore and maintain the local river and create a biodiverse native habitat for New Zealand native flora and fauna to survive and flourish. Mathew explained:

> Part of the reason it's called an impact project is that [it] has to benefit the community. So they do things like the native reserve, like organizing cultural evenings, where you might have Pacific or kapa haka [Māori cultural] groups performing and that sort of stuff.
> One of those impact projects is working in [the reserve] every Friday. And it's a big job now, because some of the trees … are starting to grow quite well. And …, the weeding and all the maintenance of that is pretty major….

Despite the explicit mention of Earth stewardship in the school's year 13 graduate profile, Mathew conceded that his colleagues vary in the priority they give to education for environmental sustainability and the urgency of action on climate change.

> … you have members on staff who just jump in, and no matter what you ask them, they just pick it up and go and go and knuckle down. And then [there are] others who put their hand up every time there's a change … and sort of bring a bit of balance, I guess, but possibly don't understand the whole kaupapa behind sustainability and why we're trying to push this particular curriculum for our students … because the world they're gonna grow up in is, is so much needing to be healed.

The ”balance” that Mathew refers to here is between attending to sustainability versus keeping up with the pace of all the other top-down changes and priorities that are being required of teachers. He explains:

> … we've had lots and lots of change in our staff and school in the last little while. There are lots of staff that are .... Just thinking can we, what's the word, cement some of the things that we've been trying to focus on in the last few years and make those happen without having to introduce a whole lot of other stuff. …
> And how [do] we balance that for our staff and community and students so that we're not sitting there being stagnant, but we are actually doing a good job of the things that we want to implement ….

When I asked Mathew if the school and its supporting community were adopting sustainability and recycling consciousness he replied:

> They are. Even little systems around school, you know, we have pig buckets, we have recycling of paper, all that sort of stuff.

The school had also attempted to establish a community garden but has struggled to make it sustainable. The story Mathew tells about this garden illustrates well some of the challenges of unity, commitment and practicality that a school community and its leadership must address if they are to make real progress toward establishing a sustainable campus.

> it was a community garden. And they did a combination of growing vegetables and flowers and stuff, which were going to be dried. …, but it ran for a trimester and … gardens need all-year care so at the moment it's looking pretty rough because it hasn't been worked on for the last trimester. … The teacher that ran that module, she's still into it, and she still wants to run that module, you know, again, next year, with a different group of students. … but …, how do you keep it going if she leaves, [and] someone else comes along with not the same energy or focus.

I asked Mathew how the school leadership and staff might organise to ensure continuity for these sorts of sustainability-directed initiatives. He described how extra-curricular duties are collegially shared in the school and revealed the relatively low priority accorded sustainability projects in this process.

> Each year we fill out a responsibilities sheet, extra-curricula or curricula.... and it'll have things down the side like the community garden, and all the sports and everything that you want to put your name against. … you could have 10 people offering to do the community garden. Most times we get two, for the last couple of years, it's been the same person, but.., if she leaves … hopefully someone else will come along … and say that they're keen to be part of that …. It's effective from

> the point of view of people putting their hands up and sharing the load. But just because of the nature of the list, some [responsibilities] require hours and hours of work like the garden …, so I don't know if it's quite balanced.

It is worth noting that in round 2 of the Delphi Survey Mathew reported that his school was effectively addressing some or all of the outcome goals across all nine subdomains of the SWM framework in its years 11 to 13 curriculum. From his comments above, the school's progress—in the Ecosphere domain at least—appears modest when compared with some of the Units and school contexts described by other teacher participants (see Sections 5.3.5, 5.3.6, and 5.3.11) and shows how subjectively the phrase "effectively addressing" can be interpreted by stakeholders in a school community.

### *C-3.3 Anita—Education for Sustainability*

Anita's 'Education for Sustainability' course is an exemplar of how cross-curricular this subject is. The students that choose this course and stay with it for the full year are exploring all three subdomains of the Ecosphere through solar energy projects, the school organic garden, and a river health monitoring project with support from external consulting firms, the city council, and organisations like Kaitiaki wai—Waterwatch NZ. They also grapple with Social Justice issues which Anita says, most students seem to prefer over the 'in Nature' Ecosphere projects. The "climate course" she refers to in the following quote is the Cross-Curricular Holistic (CCH) project 'Āhurangi Climate' (introduced in Section 5.3.8 and detailed in Appendix C-3.8) which she co-teaches with two colleagues in the same school.

> Whether I'm doing the climate course, the EFS course, or our social studies, course I'm always trying to get some sort of action, and that's where they get choice …. They can choose whatever they like. I usually teach something up front, but I'll mostly be teaching how to pick an issue. … A lot of them are worried about things like food poverty, and homelessness. Rubbish, waste plastic, a lot of them are worried about that. … Not too many of them pick what I would call traditional ecology-type projects. … I get the occasional one who wants to try and reduce the carbon footprint by starting to bike or something. They're interested in fast fashion. So they might organize a clothing swap. They try to make people reduce [their] rubbish. They're interested in cutting down on electricity. … Or they might invite someone to school to talk to the other kids. ... But yes, they're quite interested in people as opposed to going out and doing something in an ecosystem.

And what about political activism? I asked. Do they get involved in the climate strikes or write to the city council about local issues?

> Some of them do. … go on all the climate strikes, because it's quite easy for us. We're in town. And we back them up with that, provide them [with] resources to make their posters …, and tell them how they can leave school legally, that sort of thing. … I had a student last year, [who] did [a] social studies, [standard] where you have to make a policy change, and he was trying to change the marijuana laws.

The students also have the opportunity to question and discuss the cultural underpinnings of sustainability and wellbeing.

> We have a philosophy class. and they talk a lot about worldviews in that. And I talk a lot about indigenous worldviews, like kaitiakitanga. I spent a lot of time on that. I don't know that we spent a lot of time looking at other cultures and other parts of the world. We spent a lot of time talking about the Western worldview and the Maori worldview and indigenous worldviews.

Anita was open to the suggestion that CCH lessons based on the nine SWM subdomains and involving 40% of the timetable, could be made compulsory for all students at her school. She described it as "possible", providing all staff and senior management could be brought on board with the idea.

> Ten hours a week? Yeah. Something like that would work at our school, ... if it was set up, and you had buy-in from the senior management because we are doing little bits of that anyway. We make them do health. ... for about an hour a week. So that's already there. ... personal health, but also the health of the community. So that fits in quite easily. I mean, at the moment,... learning advisors could do that on their own with their home base if they wanted to. But to make it a school-wide thing, it's possible …, you know, we have a reasonably flexible set-up, if you've got everyone on board with it.

The school leaders and teachers may be sympathetic to the idea of giving sustainable wellbeing a more central role in the curriculum and timetabling priorities, but Anita sees the students and parent community as still needing some persuasion. She explained:

> … we have as a school decided we are going to be an enviro school, and we were trying to be better. So they might be keen on it. It's just how it fits with that [student] choice model.

A key element of the school's kaupapa (philosophy) is fostering student passions, initiative, and choice. The balance between offering a wide range of course options and introducing mandatory sustainable wellbeing lessons could potentially be difficult for the school to navigate. Anita continued:

> ... that would be tricky. Because already ... we've made health compulsory. And there's a few kids and parents pulling out of that, more than you would get in other schools. Because we're meant to be feeding the students' passions. And although ... most parents will make their students do English and maths and pick an English and maths class. I don't know whether they would be on board with having requirements. Yeah. It might work in other schools, but possibly ours, you would get a bit of pushback from the community.

There are however wider social currents in play and connections among schools in the city that could also influence student and parent curriculum priorities. Anita spoke enthusiastically about Christchurch's Climate Action Campus initiative.

> This climate action campus, … is now a satellite part of our school… It's on the old Avonside girls [high school] site. At the moment, there's another school there, but they're moving out to their new building next term. And we'll have the old campus. … We've already started on a bit of the Red Zone next to it. Yeah, just biding our

> time till we can move on … there are going to be 5-10 other schools involved in it as well. And we all have access to that site to do things to come up with action for the climate,

The Climate Action Campus was established in May 2021 and occupies an area of 1.8 hectares bordering land that was 'red zoned' following the Christchurch earthquakes in 2010 and 2011 (RNZ, 2021). One of those other schools Anita refers to is the setting for 'Te Ara-Year 12', the last metacurriculum unit in this collection of nine (see Section 5.3.10, and Appendix C-3.10). The Climate Action Campus will increase student access to green open space for Anita's school which is located in a city CBD and has no playgrounds of its own.

Anita suggested that a persuasive 'marketing' approach might have more success with students and parents than attempting mandates. Teachers at her school are expected to design courses that must compete with their colleagues' courses for student participation and students can swap courses each term.

> You'd have to sell it. And then and to be honest, if it is boring and dull, Why are you doing it? So you need to make it interesting for the kids to want to do it. ... because at our school if the kids don't sign up, If you don't get many kids in your class, it's canned. And you have to go and help someone else teach a bigger class. So there's an incentive to make a good course for kids to sign up to.

There are, however, downsides to maximising student choice across the whole curriculum. Anita concedes that choice, specifically students' freedom to choose new timetable options each school term, has undermined the full potential of the team-taught CCH Unit 'Āhurangi Climate' (see Section 5.3.8) which involves four separate disciplines and runs all year, six lessons a week. The school has also found it necessary to establish limits to choice based on subject continuity, parental expectations and teachers' professional judgements about content that needs to be core compulsory for all students, particularly in the middle school. I asked Anita, Do you like that student choice model? Or do you find it a bit constricting? She replied:

> I do like it because I can teach what I'm interested in and what the kids are interested in? ..., but I'm aware that there may be some things that you need to teach that maybe get lost. And the fact that the kids can hop in and out of classes, they may not get all the science they need by year 11 if they haven't followed the strict program. And then they will have to catch up. So, there are downsides to it.

I suggested that part of the day, perhaps a morning session for one to two hours—the 40% of the timetable structured around the SWM domains of sustainability and wellbeing—could be mandated for all students, with the rest of the day then given to optional subject based courses and favourite subjects. Anita agreed in principle but explained that teaching enough mathematics would likely remain problematic.

> Yeah. We do something like that, with [our] sevens and eights. They stay together for a couple of hours a day and do math and English and literacy. ... you could couch that in an, ... environmental project .... but what they're finding [is], they're struggling to get the maths in now they're doing that, they're not getting enough maths. So they've had to stop and pull maths out and teach it separately.

Anita teaches the 'Education for Sustainability' Unit by herself. She stresses the important role of external agencies and parents in helping her organise field trips to provide students with the breadth of experiences that the subject requires. Anita expressed the need for more connection with community "sustainability groups" and described how conflicts within the existing timetable constrain those making those connections and Education Outside the Classroom (EOTC) activities. Despite these constraints, Anita has established productive links with numerous external providers. She explained that because the school is in the city centre:

> It's quite easy to do something with the council … and they run a lot of programs. So I'll often sign up to some of their nature programs, and we'll go out for a field trip. And they'll run it. …. and I think I mentioned the Kaitiaki Wai people. They look after the waterways, and they have a load of really expensive equipment that we don't have. I'll go out to them when I'm doing a field trip. [Nature Agents] is another one …, they give schools a site at their local river, and you look after it, , and you monitor it as regularly as you want to. … They gave us a big box of equipment … and they gave us training, which was quite intensive. … now we know how to use the equipment, we can do it ourselves. … That's run by EOS ecology [https://conservationjobs.co.nz/]. So they've put quite a lot of resources into getting that into schools.

In contrast to Mathew's cheerfully positive and possibly overstated evaluation of his school's effectiveness in covering all nine subdomains of the SWM framework in years 11 to 13 classes, Anita was more tentative and understated. Again though, her interview comments, show how subjective individual teacher participant responses to a phrase like "effectively addressing" and the exact language used by the researcher to characterise each subdomain, can be. In the second Delphi round, Anita considered her school was not effectively addressing three subdomains: Maker-Recyclers, Regenerative-Cultivators, and Others' cultures and World views. I asked her why she had omitted these three subdomains and the following exchange shows how we arrived at a more nuanced and positive evaluation.

> [Anita] So the Maker Recyclers, I'm looking at your table now. "Making human-built physically modified environments in ways that harmonize with and sustain the earth". I ticked that because we don't go out and do anything like that.
> [Researcher] You're doing the solar project, now.
> [Anita] True. But we,... do little things. That sounds quite grand. And I didn't know what it was. I don't think what we did fitted in with that. Oh yeah I suppose you could say our gardening at the climate action campus. Maybe we're trying to … organically garden?
> [Researcher] Yeah, that's definitely the Regenerative Cultivating idea.
> [Anita] Yeah. So perhaps I didn't really understand that.
> [Researcher] Yeah, well, that's my problem, though. … If it sounds too grand. …, that's not getting at what I want to find out, you know?
> [Anita] Yeah. And I suppose with our project down the river, we are collecting data. It's like a citizen science project. And it's contributing to a database. So maybe we are doing that better than I thought.
> [Researcher] And other cultures and worldviews?

> [Anita] Oh, to be fair, we probably do, do that a bit. Well, I mean, we have a philosophy class. … and they talk a lot about worldviews in that. Yes. So, Maybe it's not that weak after all.

### *C-3.4 Claire—Working Title*

In the second Delphi survey round, Claire chose:

- Whanau and Community
- Our cultural inheritance, and
- Others' cultures and World views

as the cross-curricular teaching teams, she would most prefer to join if her school offered teachers the opportunity to join any three of the nine available SWM framework subdomain teams. They give some idea of the direction Claire's proposed course 'Working Title' might have taken. She explained her choice saying:

> These three sit within my own subject well. They also meet the key competencies in the curriculum.

In the first Delphi Survey, in response to the question "What knowledge, Issues, and Big Ideas should be foregrounded in the Social Justice Domain" she wrote

> I want the students to see their lives outside of school and how community is directly related to the social world and then in a sense the political world. Right now they see school and their social lives as the be-all and end-all. But they don't realise that the school they attend is directly integrated into the community and that the skills they learn in the classroom are designed to help them be better citizens and contribute to the community in a positive way.
> But then they also need to see the bad side of community and social relationships. How it goes wrong, in what ways and what we can do about it. How we can help others.

About the Cultural Vision Domain, she wrote:

> The history of New Zealand in all its gore and glory. Let's not skip over the bad stuff but really get into what happened in the past that created who we are now. But I also want them to learn about important events not just in New Zealand history but worldwide. I understand the importance of our own history and I believe that it should come first, but I don't want to send students into the world with a very limited understanding of the history of other countries, especially if we want them to travel or work with members of the community. New Zealand is heavily multicultural so shouldn't we learn about all cultures and histories?

### *C-3.5 Tara—AGE Adventure*

The AGE Adventure project proposal includes a weekly, whole-day, farm pioneering component. Students from a range of year levels will participate in the project which will cater for up to 8 students at a time. The students will spend one day a week at the farm and one day a week doing related self-directed study at the school. Tara says the "students will be documenting the journey through vlog/photo journalling."

> One day a week is dedicated 'action' time and the planning/research time can vary as students design their own independent study times and what they do in them.

The school's philosophy stresses student wellbeing and strongly supports explicit social-emotional, project-based cross-curricular and self-directed learning. "Learners' wellbeing needs to be placed at the forefront of their education in order for them to have the tools to manage their wellbeing in the world," she says.

> Our school has a heavy focus on social-emotional, wellbeing, and integrated learning. We already have timetabled sessions for EQ and project-based learning. Our curriculum is run over three years, with termly themes which integrate the current NZC and often go beyond the NZC.

At the same time, Tara also notes the need for formal timetabled subject-based skills development.

> There is some research to suggest that subjects like maths and English still need to have their foundation skills to be explicitly taught in silos.

Tara is the Deputy Principal at her school with responsibility for curriculum and pedagogy. The 'AGE Adventure' project she says, will be led by a staff member who "has a passion for outdoor, integrated learning" and "specialist teachers will be involved in the project on an 'as required' basis". Teachers from all learning areas will contribute. Other collaborators are also an important part of the envisioned project. Tara writes:

> As many collaborators as possible will be welcomed. Particularly in sustainability/environmental sciences, technology/Trades, and parent volunteers. We have strong relationships with the local community and are located in a position to access a wide variety of people and places.

The potential for timetabling conflicts is less in this school than in most since the roll is small and there are only fifteen students in years 11 to 13. The school provides each learner with a programme tailored to their strengths and interests, and the learners design their independent study times and what they do in them. However, as Tara notes in commenting on NCEA qualifications (see Appendix C-7.3), their small number of students and thus also the limited number of specialist teachers currently constrains the range of standards the school can offer its senior students. The school is designated by the Ministry of Education as 'Private: Fully Registered'. Parents of students in years 10 to 13 pay a tuition fee of $25,500 per year. There is also a Capital Contribution Levy of $1,150 and an Activity, Stationery and Resource Fee of $2,750 per annum.

### *C-3.6 Deb—Harsh Summer*

In her project outline, Deb described the context of 'Harsh Summer' as follows.

> This is a technology project using the design thinking process [steps] of empathy, define, ideate, prototype, and test. The project looks at the sun's harmful rays in New Zealand and their effects on society. It begins with a scientific look at what makes these rays so harmful, working with empathy to appreciate how these rays affect society. The basic concept is to design a product that … an end-user can use to protect themselves from the sun. The majority of the learning will be in the classroom, around school …. I would want them to attend EOTC [Education Outside the Classroom] for a day. [That part of the] project has not been trialled so could be extended.

Deb particularly emphasised the empathetic element in Design thinking. The 'soft skills' of creative agency and collaboration are also important competencies that Deb seeks to develop in her students.

> [Design thinking] … is a human-centred design process. So you're focusing on, you know, real people, … an end-user. And, the … society and environment that it's going to be set in…
> Using the design thinking process allows for creativity and collaboration. Group work is key to this project.

The cross-curricular component of the project appears limited to the science contextual introduction mentioned above. Deb lists only technology learning area achievement objectives at levels 5 and 6 of the NZC as relevant to this project and uses only two NCEA achievement standards, also both technology, for its assessment (See Appendix C-7.4). Among the Sustainable Wellbeing Goals (SWGs) for this project (see Appendix C-4.2) Deb selected "Students will be asked to Investigate, critique, and take action concerning the United Nations' SDG 13: (i.e. Take urgent action to combat climate change and its impacts)", and noted that "possibly science standards" could be used to assess this SWG.

Deb was one of two teachers who mentioned the challenges of negotiating the use of NCEA standards in a cross-curricular Unit when teachers in other learning areas might also be offering those standards to the same students in their Units. The other teacher was Nicola (Section 5.3.9, Appendix C-3.9). In planning 'Harsh Summer', Deb had considered incorporating social science, mathematics and English NZC achievement objectives, and NCEA standards but abandoned these ideas in the absence of any process for coordinating those cross-overs with the other teachers concerned. Speaking about the 'Harsh Summer' Unit she explained:

> It's got science in it, I did put social sciences in [but] it was linked too closely to one of the technology strands. … the impact on society. So, it was very similar. So I took that out. And also … literacy [and] numeracy because obviously, …, you need new terminology, and mathematics as well which you use a lot when you're creating patterns … and adding together so very basic, but you know, it's still there. … So science and mathematics and English would have to be consulted because if they're using those standards, you can't cross over

When I asked whether the timetable provision for cross-curricular lessons at her school needed to be increased, Deb answered:

> It needs to be. … I do a bit of cross-curricular. Well, more interdisciplinary. So [I … bring in] knowledge from other areas. … I find it very successful when I've done it. And the students enjoy it, but it has to be very explicitly taught [teachers] need to explicitly say, this is not actually what I normally teach in here. …, we're bringing it in, because it's relevant to this context.

Knowing that at least two of my other teacher participants have consulted and worked extensively with their senior students on the development of their sustainability and wellbeing curriculum, I asked Deb how her students might respond to the SWM framework we were discussing. Her reply was candid, pragmatic, and hopeful. It also illustrates, how students' sustainability consciousness reflects their community's and school's priorities and again the potential for educational leadership to raise that consciousness.

> I think if there was a trip involved, that'd be fine. [One] year, … with my senior students I focused on …, the oceans and the effects that things were having on the ocean. So they could only use natural fabrics, that break down naturally. If they didn't then they needed to justify why they weren't using them. And … they did a lot of printing and dyeing prints and they had to be natural. They had to be water-soluble, and cause [minimal] harm to the environment. ... So yes, some of the kids got quite a bit out of that … [and] Yes, There was, [a trip involved] there was Kelly Tarltons. … then down to Mission Bay for lunch. …. And then McDonald's on the way home?

Deb was strongly opposed to her students having phones in school but was also enthusiastic about the educational potential of digital technologies to engage them in developing sustainability attitudes and behaviours. Students, she said, also need to understand that taking the trouble to recycle resources saves builders money as well as being good for the environment and that digital games can help develop that awareness.

> Digital technology is really, as you know, a major important aspect. It's only just coming in, but there's a lot of work being done … in things like virtual worlds, like, Minecraft, where they build worlds, and … structures …, creating a world where, you would have to use materials that, are from, say, a rubble building, and you'd have to create a new building, …, because there's that new company, in New Zealand [that] is taking all the old wood, materials from demolished buildings, and then recycling it all and putting it together into, you know, other structures. …

She also noted the importance to students' wellbeing of understanding what safe use of digital technology means. "We talk a lot about the digital footprints. And, sensible use", she says. Primarily for Deb, the technology is an accessible, powerful cross-curricular student engagement tool for teachers and schools that might have limited Education Outside the Classroom (EOTC) alternatives. When I asked her about finding the right balance between 'doing' sustainability virtually and doing it physically outside the classroom, she responded:

> It's like gamification, which, you know, a lot of kids sit on games. ... of course, field trips and things like that, … But, you can work it in with science, and with technology…., that's another way that engages kids. …, if a game's doing something like that, then they might find, more interest. And it's cross-curricular as well, … so bringing in science, … to support their learning. … If there was anything that was

> online that they could look at and interact with, then I would let them do it because they find it really interesting.

Deb was enthusiastic about the idea of being part of a cross-curricula teaching team. She had experienced coordinated thematic programs of lessons across learning areas but had never been involved in what she considered to be a true cross-curricular, peer-to-peer co-constructed Unit for students. Deb says:

> I love team teaching, I like having teacher aides around, ... I've never taught with another teacher. But … to have a teacher aide is invaluable, you know, just to assist with doing things and, you know, bouncing ideas off.
> We did [a Unit] a few years ago, it was astronomy. And it was across year nine. They called it cross-curricular, but it wasn't cross-curricular. It was just different learning areas doing their own thing. [But]…
> It … was really, really good… it was worthwhile. … We got together. …A teacher from each learning area would come in, and we would sit down and discuss it with the assistant principal that was in charge, and talk about, … what we were going to do,... the frame, the unit plan, and then we … put in our … weekly ... lessons.

In round 1 of the Delphi survey, Deb felt that 38% of the weekly senior school timetable should ideally be dedicated to cross-curricula Sustainable Wellbeing directed learning as compared to specialised subject-directed learning and added:

> To implement sustainable wellbeing, it must be integrated into all subjects. The implementation is necessary so that students can see how it crosses all curricula areas.

Her emphasis here is clearly on the primacy of the traditional disciplines and subject specialist teachers in delivering education for sustainability and wellbeing. She continued:

> Wellbeing is a topic at the forefront of education. From experience, students do tend to tire of being taught topics like this regularly.

This comment suggests a concern that ‘wellbeing’ is too often presented in secondary schools as a limited generic topic, consisting perhaps only of well-intentioned feel-good exhortations, with simplistic concepts and skills that don’t require repeated practice in diverse contexts or lend themselves to endless investigative possibilities or learning progressions that need to follow students’ personal and social maturation.

At the time of her interview, before submitting her Unit outline for ‘Harsh Summer’ in round 3, Deb was thinking about the SWM proposal in ways that go beyond simply integrating sustainability and wellbeing within the existing Subject-Based Specialist (SBS) education paradigm. When I asked for her evaluation of the overall usefulness of the SWM framework for thinking about Sustainable Wellbeing (SW) education in years 11 to 13, she replied:

> [Deb] … I think it's good. I think it also just needs to be considered, … where it would sit within… each learning area, or whether it would be a whole, … separate learning area.

Like Claire and Mathew, Deb expressed concerns about making room for sustainability and wellbeing in an already overcrowded curriculum. She also commented on the importance of keeping courses at this level related to assessment and accreditation, and subjects with high status for University Entrance. Referring to the proposed SWM framework she asked me:

> Do you think …, there would be pushback from people thinking it was moving the curriculum away from …, specific learning? ... And also, if this was going to be 40%, of the curriculum? [Do] you think that this would not support student learning in certain areas, … to move [them] towards certain areas of further study or work?

I confirmed there was indeed pushback from some participants in this study and explained that the intent of the SWM is for all Cross-Curricular Holistic (CCH) and Subject-Based Specialist (SBS) projects and courses to support and be supported by appropriate assessments for school-leaving qualifications. The conversation continued:

> [Deb] So … these would be credit-based projects?
> [Researcher] Yes, that's the intention that they would be bringing in achievement standards that are appropriate to each area.
> [Deb] … So these would have to be linked. to university outcomes wouldn't they, so like UE [University Entrance] and things like that?
> [Researcher] Yeah
> [Deb] So, yeah, they'd have to be quite relevant for people to want to take them. I mean, technology is UE entrance, [but] Students don't really care that much about it. You know, they don't see the relevance, unfortunately ...

The conversation moved then to attitudes and values within the school as an institution. I asked Deb, if the teachers in the school raised sustainability in their priorities, might that change the children's point of view. She thought it would and that:

> it [would] build that empathy as well. …, because .... there's this big thing around … building the stages of design thinking within technology at the moment and DVC [Design & Visual Communication]. And that first stage of empathy is quite a tough one, because students at this age are still building their own empathy … teaching students how to empathize .... [with], sustainability,… and to care about what someone else is doing as well. You know, for example, if they see someone else … littering. It's like, Hey, come on. ... having that consideration and … care.
> … We have a lot of issues with rubbish. terrible issues …

In Deb's view, her school was not effectively addressing any of the subdomains of the SWM framework for its years 11 to 13 students. The reason given that the school has no recycling bins she says is "that they cost too much". Comparing this school's situation with the success of the waste-minimisation project at Rebecca's school (see Section 5.3.10, Appendix C-3.10) shows again the importance of school leaders' priorities and resolve in shifting their community toward sustainable wellbeing. Rebecca says that the only cost to sustainably reduce their waste to landfill by over 50% in one year was "eight cans of spray paint to colour code bins and some photocopying to do the posters". At the same time, the contrast in socioeconomic conditions experienced by the students at these two schools and its effect on their affective relationship with their immediate environment must also be acknowledged.

The student ethnicity ratio at Deb's school in 2022 European/Pākehā:Māori:Asian:Pacifika:Other ethnicities was; 39:39:8:9:5. She is keenly aware of the significance of the Ministry of Education's increasing emphasis on mātauranga Māori for her students and school community. She also empathises with the situation of Pākehā teachers who have little or no knowledge of mātauranga or Te reo Māori. In the second Delphi survey round, Deb commented about the SWM subdomain of 'Power and Influence' saying that teachers would need an understanding of critical pedagogy theory to guide students in exploring that subdomain. When I asked her to elaborate she replied:

> I think, my mind was probably on something more about, understanding, like kaupapa and, mātauranga Māori and, trying to develop that in teachers …. Because I know, from a lot of conversations on webinars about the refresh achievement standards, there are a lot of teachers concerned, [about] how do we teach mātauranga Maori? …, we can't rely on the Te Reo teachers, they've got enough on their plate. How can we develop this to show, … it's part of our, … teaching practice? … We've got whanau and community, and, you know, you have to try and develop those. And that has to be whole-school.

Deb saw this major professional development challenge for teachers as a personal and collective responsibility that her colleagues and school were attempting to address.

### *C-3.7 Daniel—Urban Farming Outreach*

In 2021 'Urban Farming Outreach' had to adapt to the reality of the Covid-19 lockdown. Daniel says:

> this year [2021], … they did [a] sort of seedling giveaway. They didn't have heaps of time because we were locked down so they grew a bunch of seedlings and went to the middle of the city and just started giving away veggie seedlings to folks and got some koha as well for the farm So, yeah, it's trying to engage that community aspect as well. … seeing how you can really make a big difference just through inspiring people rather than trying to do it all yourself, ….

The trades academy that Daniel works for was founded in Northland in 2012. The first class was a group of disaffected ākonga (students) not expected to achieve anything academically at school: eighteen Māori boys, four Pākeha boys and two girls. The following quote is an extract from the academy's story, as told on its website:

> That year all ākonga learnt how to trap [opossum] and run a small fur collecting business and they all passed NCEA from the co-created innovative curriculum. More importantly, all the rangatahi began to see themselves as valuable, capable and successful. They connected to their whenua [land] and realised how important being Māori was to them. The non-Māori learnt respect for Mātauranga Māori.

In 2022 the academy had 162 students and 11-13 staff located in 5-6 urban and provincial centres across the motu, mainly in Northland (Pangaru), but also in East Cape, Raglan, Wellington, Porirua, and Greymouth. The number of students in the small Raglan Area school varies according to demand.

The academy's projects and courses evolved from Education for Sustainability in the New Zealand curriculum and are all built around the two NCEA Education for Sustainability achievement standards 2.1 (90810) and 3.1 (90828), “Undertake (2.1), and Evaluate (3.1), a personal action, with reflection, that contributes to a sustainable future”. These two achievement standards are supported by a range of NCEA unit standards to provide students with appropriate vocational accreditation. Daniel described how their courses are related to New Zealand’s standards-based qualifications framework:

> the education for sustainability 2.1 and 3.1 standards, the action assessments [are] ... the centre of all our courses across New Zealand. … we're a Trades Academy, technically. … For our funding, we have to offer unit standards. We have to offer at least 20 unit standards. So we don't have time to run any other academic standards normally.

Daniel was particularly enthusiastic about the potential of the Education for Sustainability standards to foster students' powers of self-assessment and reflection on their own sustainability and wellbeing development.

> [Daniel] … that [3.1], is an awesome standard. … it just fits so well, with what we're doing. …, it could be improved, but it really hits the marks that we want to see. Especially because it has a whole outcome around … how their attitude and behaviour change, you know, what [other] standard has that? … they actually discuss their personal attitude and behaviour change because of their project, which is awesome.

Personal attitude and behaviour change are explicit goals of the SWM framework competencies in the intrapersonal and interpersonal domains of Hands, Heart, Head, and ‘Integrating Self’. As Daniel highlights, there appear to be few formal assessment instruments teachers can use that address these competencies.

In round 1 of the Delphi survey, Daniel stated that in his view 50% of the weekly senior school timetable should ideally be dedicated to cross-curricula Sustainable Wellbeing directed learning as compared to specialised subject-directed learning. Arguably, Daniel’s Trades Academy with its small number of sustainability-oriented courses could already be described as 80-100% built around a Cross-Curricular Holistic (CCH) project-based pedagogy. At the time of his interview, the academy was providing its NCEA accreditations through a subcontract to a registered New Zealand Qualification Authority (NZQA) provider called The National Trades Academy, an arrangement Daniel experienced as constraining both financially and educationally. I asked him if he could see their academy expanding and he said:

> Yeah, for sure, we're often in demand ... And there's just not a whole lot of environmental educators out there who can do it … funding is always an issue with us. We're in the process of becoming a private training establishment. So next year, if that all comes through, … we don't have to subcontract to National Trades Academy and pay lots of money. And we can create our own curriculum a lot easier.

As mentioned earlier, that transition to becoming a private training establishment was completed in March 2023. Their long-run plan is to progress from running courses for students to providing

professional development for teachers which Daniel sees as having to also involve networking with other organisations outside of schools.

> [Daniel] …, eventually, we're going to stop running courses, and we're going to run professional development. … our teacher in Greymouth, … she's just got some funding to help do professional development for the teachers on the west coast around environmental education. … there are teachers [that] are really keen, but …, they just don't have the expertise. And, I guess the networks involved in so much of what we do is like, utilizing the community groups and the NGOs and the folk that are already doing awesome stuff and just connecting that with what the students want to do because … if you want to [do it], just within your school … it's just not going to work I think.

The Academy runs both short and long courses like 'Urban Framing Outreach'. In 2023, Short courses like Apiculture, Wai Fencing, and Predator Control, which run for 2 to 4 days cost $460 per student for a group of 10 or more students. The cost of long courses is negotiated with interested schools. Both types of courses are eligible for funding assistance through the Ministry of Education's STAR and Gateway schemes for schools.

Daniel provided me with an internal document from his Academy titled *Tiaki Taiao Regenerative Enterprise Model of Learning* which tells the story of how taiohi (young people, youth, adolescents) on one of their courses turned an environmental pest control project into a successful commercial venture. After raising $800 from organising a competition to see who could remove the most pyura (seaweed pest) that were contaminating kutai (mussel) beds on a local reef, the taiohi;

> researched how to make fertiliser from the pyura. They then designed an experiment testing its effectiveness, measuring a 35% advantage over a control [plot] of pasture growth. They added seaweed to the mix and marketed it as an Organic Pest To Product Fertiliser. They sold a few bottles, made a few dollars, and then received an order for a 1000L making thousands of dollars.
>
> (Papa Taiao, 2021)

Not only were the students helping to address a real biosecurity and food source threat, they learning academic concepts through field-based science, while developing agency, experiencing self-reliance and funding their own education.

### *C-3.8 Anita, Adam, and Ben—Āhuarangi Climate*

The Cross-Curricular Holistic (CCH) Āhuarangi Climate Course was proposed initially during a "Blue Skies", teachers only, "Accord Day". Anita, Adam, and Ben held a planning meeting in September 2021 and a student voice meeting followed in Oct 2021 to discover what students thought a course on the climate issue should look like. In an NZAEE (New Zealand Association of Environmental Educators) webinar in 2022 Anita recounted how the students responded to this consultation:

> They told us, You need to talk about why climate change matters. They also said that mental health was really important. A lot of them have been involved in the

> strikes, and in other areas of climate change. And they were finding it was really taking a toll on their health. So they said you've got to include something in that for us. They said don't just stick to social science and science. You know, there is more, there are more curriculum areas where students can contribute to doing something about climate change. …. They also want to know how to listen to people with different opinions, how to listen to them, calmly and understand their point of view and hear where they were coming from. They said teach us about power mapping. I'd never heard of power mapping. But I have now looked it up. And we've … done a lesson on that. They said yes, you need to be hopeful and say that it's possible to do something …

I have framed 'Āhuarangi Climate' as a CCH project even though all lessons fall within what Anita described as the Subject-Based Specialist (SBS) segment of the timetable because it is taught by a cross-curricular team. The teaching team's backgrounds represent four distinct disciplines: social sciences, English, science, and philosophy. All four disciplines select content and skills that further students' understanding of Climate Change, the unavoidable imperative within all nine subdomains of the SWM framework. Anita, Adam, and Ben negotiated with the school management to have their combined six weekly lessons timetabled in adjacent periods to facilitate field trips. As Anita recalled:

> We went to pitch the course to the director at the end of last year and said … We'd like to run it across two classes. So we have the climate science class in green, which Adam runs. And then we have the blue classes which Bob and I do, which are more social science, philosophy, and health. You can see [in Table 5-5] that the blue and the green are next to each other [on Mondays and Wednesdays] so that if we want to go out of the classroom for half a day, it's much easier to do.

The 'Āhuarangi Climate' unit is, however, still an SBS course in this timetable in the sense that its component blue and green blocks are optional. Anita admits that this absence of mandated student involvement and commitment to the unit has undermined its educational impact. Only five of the 35 students doing the course at one time were gaining the holistic perspective the teachers had intended by attending both the green and blue classes. Furthermore, some did not stay in the unit for the whole year.

> … not all students picked both the green and the blue classes which we kind of predicted because we're in a choice school. We can mandate that you have to take both so we have I think about five students who are doing both classes. Otherwise, we have about 20 in each. [Our] students can change their classes every term if they want to. So some of the students will not be with us from the beginning to the end, they're coming into the terms that they're interested in what we're doing.

The five-page course outline document for students sets out a termly sequence of perspectives on climate and climate change along with their NCEA assessment opportunities, individual project suggestions and many challenging questions. In 2022 the term plan was:

Term 1: Beliefs about Nature and Stuff

Term 2.1: Hauora/Wellbeing & Living Lightly

2.2: Manaakitanga & Rights

Term 3: Solutions and Actions

Term 4: Student Choice & Finishing Off

These perspectives align well with the SWM domains, Cultural Vision in Term 1, Ecosphere in Term 2.1, and Social Justice in Term 2.2. The student-led 'Solutions and Actions' projects undertaken in terms 3 and 4 could fall in any one or more of the nine SWM subdomains. The boundaries between perspectives are not hard and fast, however. They demonstrate something of a fractal nature resembling the underlying structural principle of the SWM and the complex systems nature of sustainable wellbeing education. In term 1 for instance, the philosophy teacher challenges the students' thinking to:

> [examine] philosophical questions that arise when we consider the human/environment relationship as perceived by a range of different traditions, including Māori (and other Indigenous cultures) along with the Western viewpoint which arose from the Greco/Roman tradition.

These questions belong particularly in the SWM Cultural Vision subdomains 'SD7: Our cultural inheritance' and 'SD8: Other cultures and World views'. The science teacher, at the same time in his lessons …

> Begin[s] by investigating the relationships between the greenhouse effect, greenhouse gases, and local and global sources and sinks/storage of these greenhouse gases in what is known as the carbon cycle.

This is the domain of the Ecosphere and particularly of 'SD3: Kaitiaki Guardians' which, in the SWM framework, is (self-similarly) the cultural vision/thinking subdomain of the Ecosphere.

The teachers emphasise that while the 'Āhuarangi Climate' Unit has a detailed year plan they remain open always to spontaneous changes of direction in response to serendipitous opportunities and students' questions and challenges. Feedback from the students after the course has been positive and constructive. Anita quoted students saying it was a "really enjoyable class". They love the philosophy part, enjoy having teachers from two learning areas, the class content (e.g. electric cars, alternative foods) and found the Google Classroom informative. They also felt it would be good "to get out of the building more and invite more people in. So that's the next step for us."

### *C-3.9 Nicola—Self-Watering Planter Boxes*

This Unit was taught within a standard SBS weekly timetable over a ten-week term but also included an innovative timetable exception on two or three days of the term that Nicola calls "collapsed classroom times". She explained:

> What I had to do was apply for collapsed classroom times … initially, it was popular because ultimately, it took a whole bunch of kids that were not achieving, and weren't going to get through level one, .... and … taught them in my class time.

The following interview extracts illustrate the extent to which traditional SBS timetables of regular 60-90 minute periods, for single-level classes, can be productively adapted by effectively creating contiguous multi-period, multi-level classes to meet the learning needs of particular student groups

through sustainable wellbeing learning goals. When I asked Nicola what she meant by "collapsed classroom", she replied:

> I requested time where these students were taken off the timetable for a couple of days [during the term]. And we had a space and I had all sorts of people coming in from outside. And … we did projects … the first one was looking at how do you sustain yourself, and we had done the traditional learning about the human body and the digestive system and diabetes and all that stuff. But then we brought it into life. So we had medical people come in and look at how do you test for diabetes? And how do you test blood sugar? And we had horticulture people come in from [the] Institute of Technology, and talk about how do you grow food. And then we … built self-watering planter boxes in the school grounds. And the students planted food, edible crops in there. And then we went back and harvested it, and … made pizza.

At the time Nicola was teaching three science classes and a combined year 12 & 13 Education for Sustainability class. Some of those students were doing both a science and an Education for Sustainability (EfS) class with her. The 'collapsed classroom' days were held on days when Nicola was teaching all day. All her students had permission from their other classes to be with her for that whole day. The agreement with teaching colleagues was that students could make up the missed periods in their other classes from Nicola's lesson times at a later date. In practice, as she explained:

> This was only ever claimed at the end of term/year when we had already completed assessments and students still had work to do on other subjects - they could work on any subject during my lesson time because they all completed work for my class ahead of schedule due to the huge amount of work achieved with longer blocks of time during collapsed classroom days.

Because the collapsed classroom days were necessarily multi-level, involving around sixty students from years 11 to 13, they involved a good deal of careful multi-activity coordination and logistical support.

> One of the things that worked really well was having multi-year levels. … So when we were doing projects, … fairly big projects in the school grounds like the planter boxes, and … cooking the pizzas … I had my 13 biology class doing human evolution and toolmaking. I had my sustainability year twelves and thirteens, … looking at the sustainable aspect of being able to produce your own food at no cost. And I had my year elevens, who were doing diabetes standards and healthy lifestyles, making [their] own food and being active. And then [some of] my sustainability [students], … who had Gateway placements in construction, had a little bit of background about the tools, so we had the physical tool hammer and nails happening. There was a big space [available] and most of it was outside, but we took over the tech department.

Nicola had several highly qualified collaborators working with her to make her collapsed classroom project days rewarding for students.

> I had a lot of support because I had two lecturers from [the] Institute of Technology, and [their] diploma students who needed to get experience in leading teams. And so I divided my [five] groups up so that I had at least one year 13, who

> had some knowledge of either the construction or the biology. And I had year 11s, spread evenly. And then I had a team leader from the [Institute] diploma group, working with each small group.

Nicola was in a unique position in terms of her strong connection with the local Institute of Technology where her husband was the academic lead for Horticulture. The 'Self-Watering Planter Boxes' unit demonstrates just how effective external providers can be for Sustainability and Wellbeing education.

> I could make it work because I've got very strong links with [the Tech Institute]. And the first year we did it just with year elevens. [The institute staff] came in and … set up zip lines. And, it was a bit of a careers thing as well, like these are … career opportunities in horticulture, arboriculture and landscaping … for you.

It is not hard to imagine how the concept of 'collapsed classroom days' could be shared in a mutually beneficial, synergistic arrangement with other subject areas and teaching teams across a whole school. However, the concept never gained popular support amongst the staff at this school despite Nicola inviting them to observe and get involved in the collapsed classroom project days. She recalls:

> They were all invited, and not one of them turned up … the whole of the Board of Trustees, and the whole of the senior leadership team, and all of the office staff turned up, but not one… subject teacher, Oh …, the head of Tech came.

Nicola's teaching colleagues' interest in what she was doing was limited to making sure there was no duplication between the NCEA standards she was offering students with what they were offering the same students in their classes, a challenge also mentioned by Deb (in Section 5.3.6, Appendix C-3.6). Nicola says:

> … beyond that, there was very little interest in the whole cross-curricular thing. … so yes, you can teach that, you can include that English standard, or yes, you can include that tech standard, but …, you can do it, because we don't teach that one …. And that, was quite a big barrier

She notes however that this had not been her experience at other schools where she had run similar project-based cross-curricular courses and had "huge support" from colleagues. So why didn't it work in this school? The principal and senior leadership team were enthusiastic about the results she was achieving with students but then proceeded to impose the 'collapsed classroom' pedagogy on teachers in all subject areas which was, unsurprisingly, not well received. Nicola explained:

> … the first year I did it, we had a new principal. And she was like, …, this is a great way to get the [NCEA] results. We'll do this. And across the board, She told all subject areas, they had to do a collapsed classroom. Now, nobody in that school had even ever heard of the idea of a collapsed classroom.
> Other departments tried to do collapsed classroom days but the cross-curricular element was not included so [the] number of credits gained was a fail. Also, students hated a whole day of intensive teaching in one subject.

Despite the positive outcomes of the collapsed classroom cross-curricular projects for her "bottom-set" students, Nicola found that school leaders were not impressed enough to change their approach to curriculum and timetabling across the school. She recalls

> when ... every single one of [my students] passed their level one, …, obviously, the senior leadership team liked the outcome of that in terms of the result, but I was quite surprised that it didn't change their attitude to how we should structure a curriculum, [or], a timetable.

Did the principal not understand what you were doing? I asked

> Oh she understood it, but she didn't see the benefit of investing … the time to get people on board. I mean, this is a school with many, many staff who have been there for 35 years or more. … What I realized is, it was fear that they were going to have to do this, and they didn't have a clue how to do it.

Nicola stressed that her situation at this particular school was unique. For sustainability education to succeed, In her view, it needs to be embraced as a school-wide undertaking and to be, cross-curricular, project-based, and supported with appropriate staff professional development.

> Teaching sustainability as a stand-alone subject is far from ideal - which is why I took a project-based approach. …For project-based learning incorporating sustainability to work it needs to be part of the school's strategic planning with PD to support it. In terms of applying this strategy across the whole school curriculum, it is difficult to timetable without a major shake-up of timetable structures.
>
> I was fortunate in that I was teaching across different subject areas and worked with colleagues in technology and English to enable students to submit their reports through multiple subject areas coordinated by the year-level deans.
>
> There is funding available for schools to employ a sustainability manager which may be a huge opportunity to integrate sustainability across all subject areas.

Nicola considered the unwillingness of a school's senior leadership team to consider new timetabling structures as the greatest obstacle to the implementation of innovative curricula such as the SWM that require and foster greater cross-curricular collaboration.

> I think the biggest constraint is getting senior leadership teams to seriously consider different timetabling models. I think an awful lot of this pivots on a timetable that enables collaboration. Collaboration between students collaboration between teachers. … We've spent quite a lot of time now, in education, talking about student agency, and teacher agency, and, student-centred learning and technology assisting that, but what I have seen a lot of is parking kids in front of a computer to work on their own, which to me is, is not education. It's, … the modern-day equivalent of rote learning.

## *C-3.10 Rebecca et al.—Te Ara-year 12*

### *C-3.10.1 Te Ara-year 12 Background*

Of the nine metacurriculum Units presented in this chapter, 'Te Ara-Year 12' is currently the only Unit given a school-wide dedicated timetable space specifically for a comprehensive structured

sustainability and wellbeing-oriented programme that all students take and which follows a systematic developmental progression through all its year levels. Sustainable wellbeing is treated here not only as a learning area in its own right but also as a required discipline and the issue of potential timetable clashes with other learning areas doesn't arise. As Rebecca explained:

> Around 20 staff are involved in our Te Ara programme across the seven-year levels and Te Ara time is slotted in first and prioritised when building the timetable each year.

Although the timetable has a mainly traditional SBS structure, the notion of encouraging cross-curricular connections and multiple perspectives through team teaching is well accepted at Rebecca's school and specifically leveraged in the service of sustainability and wellbeing education in the Te Ara Units. The content of lessons is responsive to student interests, and seasonal and community events. The practice of team teaching extends to include student leaders. Speaking specifically about the Te Ara-year 12 Unit Rebecca says:

> In Year 12, the course is co-designed with a team of staff and has some student input. … There [are] four [teachers] working together in year 12. So sustainability, philosophy, Te Ao Māori. And Te Reo Māori. … they're all interwoven, … and I learn so much off the others. ....
> The concepts covered relate to our values and the learning activities change each term dependent on student interests, and happenings such as Matariki, exhibitions, events in the news, community events we can connect with (such as river clean-ups) and what needs harvesting/planting in our garden. Student leaders teach all the hands-on nursery activities to their peers.

Rebecca expressed a strong belief in the educational value of trusting students with leadership roles at all stages of their development.

> Our students have presented at Sustainable Business Breakfasts, collaborated with businesses and NGOs, supported communities locally and in the Pacific Islands, and collaborated with many other schools on projects. When students are given the opportunity to lead and some time, regardless of their age, they achieve great things!

In 2015 none of the sustainability activities Rebecca mentions above existed in the school. A comprehensive transformation of the school's direction was initiated in 2015 and has continued to evolve with integral student involvement as a whole school journey. The way this evolution has unfolded provides a useful point of reference and perhaps a template for other schools wanting to reorient their curriculum toward centring sustainable wellbeing.

At the outset, Rebecca recalls:

> We had a team of students, and a few staff work together to develop a Sustainability Philosophy for our kura. … With a framework in place to guide us, we started small, with one aspect to focus on per year.

A 'Director of Sustainability' role—which Rebecca currently fulfils—was established (one hour per week) to oversee, facilitate, and mentor various projects. As these grew, students and other staff also became mentors and facilitators. Rebecca explains how student involvement is facilitated:

> For any significant initiatives potentially resulting in reduced income to the school (such as no longer selling drinks in the school cafe), students always take their proposal … to the board. For all other initiatives, I encourage students to 'just do it' and see what happens!

To raise students' awareness about how much waste the school sent to landfill and to engage them in taking action, a whole day's rubbish was collected and displayed at assembly time for all to view. Rebecca says:

> [the] students walked through the waste to get to assembly. It was 128, large black, rubbish bags. … that was pretty horrific to see. Within a year our waste was reduced by 58%, …. And the only cost to do this was eight cans of spray paint to colour code and some photocopying to do the posters. ... We take all the year 9 students to the city council's recovery facility to see the mountain of … recycling collected each day, and the people standing there, and the products made from them. …. They come back and they all want to make sure waste is separated but there seems to be a real thing at secondary schools of not separating waste. … it's easier than we expected it was going to be ...

In the second year of its sustainability transformation, the school focused on healthy food and drink-related initiatives, including establishing the school garden for learning and coordinating with the onsite catering contractors.

> Students worked alongside kitchen staff. And … they got rid of the vending machine, highly processed foods, packaged foods drinks … We became a water-only school and fair trade school, increased on-site production of healthy foods,…. [introduced] meat-free Mondays and set up a garden for learning. …. So rather than buying in food, we started making it at school.

Since the third year, the focus has been on purchasing and waste reduction initiatives developed and managed by students. Their major achievements include:

- Establishing the school's Reuse Depot which now diverts over 100,000 items of waste annually from landfill
- Reducing waste to landfill by 62% (compared to when they started on the journey)
- Collections of GOOS (Good On One Side) paper for reuse were established and maintained
- Establishing a Green Market which the Sustainability Council runs promoting mending and reuse and where students sell things including second-hand clothing.

Not only is 'Te Ara-Year 12' part of the school's core curriculum it is also the only Unit in this group of nine SWM Unit titles that foregoes high-stakes assessments for qualifications. In the interests of student wellbeing, the school has an NCEA credit limit in place. Without that guidance, there is a tendency for some students to focus on collecting credits rather than on the depth and relevance of their learning (Hipkins & Spiller, 2012). Learning relevant to the NCEA Education for Sustainability (EfS)

Standards is completed in the senior Te Ara programme, but it is not assessed. Instead, the teachers and students use a reflexive portfolio/journal called 'My Mahi' as a formative and self-assessment instrument and as an authentic individualised record of learning. 'My Mahi' is used as the platform for:

- goal-setting,
- reflections on learning, development, wellbeing,
- a Personal Development Plan (PDP),
- a personal portfolio—recording achievements, courses, and community service all in one place to add to beyond school,
- and as a relevant resource.

In Table 5-3 I characterised 'Te Ara-Year 12' as a Cross-Curricular Holistic (CCH) Project. In reality, this unit is more like a structured series of cross-curricular, team-taught sustainability and wellbeing courses that include project work. It is seen by the school as a pathway for Year 7 to 13 students to develop the four Pillars of the school's Graduate Profile: Belong, Be You, Be Your Best and Be the Change.

At the time of this study's first Delphi survey in April 2021, Rebecca noted the similarities and correspondences between this study's proposed concept of an SWM and her school's 'Global Living Programme' (which later became Te Ara) as follows:

> We already have a similar concept in place with our Global Living Programme …. Students research and take action relating to sustainability/wellbeing or service opportunities. Currently, this programme is based on working towards positive outcomes relating to UN Sustainable Development Goals.
> As a school, we've got a commitment to care for oneself, for each other and the environment. We talk to students about environmental, social, cultural and economic sustainability, so really thinking beyond just the environmental and how those are interwoven.

In that first Delphi survey round, Rebecca supported a 50% timetable share for cross-curricula Sustainable Wellbeing-directed learning as compared to specialised subject-directed learning and described the relationship between the CCH and SBS modes as "complementary". Referring to the school's Global Living programme, she commented:

> [Introducing] double periods or heading towards a half day for Sustainable Wellbeing Metacurriculum would be ideal.

The current share of the timetable dedicated to CCH sustainability and wellbeing lessons in Table 5-6. is around 10%, well short of Rebecca's 50% ideal, although CCH pedagogies are also practised in subject-based lessons across the school. In an email from November 2022, Rebecca enlarged upon the double period suggestion, specifically for the 'Te Ara-Year 12' project and its progression to year 13.

> We are discussing doing a double period for 'Te Ara at Year 12' next year to give a longer slot for mahi in the local community.

The school's Green Market illustrates the emphasis it places on support from and service to the community as part of student education. Rebecca explained that:

> All students are part of [the] Student Volunteer Army and there is an expectation all are involved in community service. Community Service hours are celebrated and those showing enormous generosity of spirit are celebrated and acknowledged with awards … Some complete 100-200 hours annually!

She also outlined just how significant the students' collective achievements have become arising out of these local connections, growing partnerships and community collaborations.

> [On] our eco-action satellite nursery … we grow eco-sourced seeds to provide plants for other schools to create a large area of forest in the red zone where the earthquake damage happened. … I'm on the trust of Eco-Action and we've got 22 schools two community gardens and a rest home involved. And ... people like the local fire brigade go and do the watering. [with the Department of] Corrections, we plant 12 thousand trees over four Sunday mornings..., through winter. … And then we've also grown 30,000 seedlings that will go out to schools next year ... And in 2024, we will plant 60,000 which is pretty amazing. But that's through lots of support from businesses. ... Everyone's working full-time. So it's all … done outside of class time.

However, Rebecca noted the "outside of class time" is not ideal and there are still adaptations to the school's administrative, timetabling, and logistical structure that would further its sustainability mission, such as:

> Making it easier to safely go offsite, in terms of paperwork would be a positive change. This prevents us working on many community projects currently. Students currently tend to do these projects in their own time rather than in the school day.

The school's community outreach collaboration with other secondary schools in the city could be a potentially crucially important strategy across the nation, for taking Sustainable Wellbeing education to scale. The Ōtautahi Climate Action Campus project is a key collaboration in which both Rebecca's and Anita's schools (see Section 5.3.3, Appendix C-3.3), are involved. Rebecca describes her school's involvement and its relationship with Anita's school as follows:

> We have just set up one of our Eco-Action Nursery Trust satellite nurseries for [Anita's school], as … the principal …, has secured the old earthquake-damaged Avonside Girls' High site. The long-term goal is for this large block of land to become a collective Climate Action Campus for schools across Ōtautahi to use, which is so exciting!

### *C-3.10.2 Te Ara programme courses*

The 2022 Te Ara programme included the following courses over the seven student year levels:

- Citizenship
- Cultural responsiveness

- Hauora, Health and Wellbeing
- Innovation & Entrepreneurship
- Leadership
- Life Skills
- Life Beyond the Gates
- Philosophy
- Psychology
- Religions & Beliefs
- Self-awareness
- Service
- Sustainability
- Te Ao and Te Reo Maori

#### *C-3.10.3 CCH timetable elements other than Te Ara*

Besides the 'Te Ara' programme lessons, there are two other periods in the weekly timetable that Rebecca describes as CCH with a sustainable wellbeing orientation; Hui time and Assemblies. She explains:

Our Hui time is school-wide, at the same time for all and specifically relating to wellbeing. As we have found from our student feedback, connecting with nature rates highly as having a positive effect on wellbeing, so sometimes in the past, I have taken my whānau class for a walk or done things such as the national bird survey with them. We have a staff 'Wellbeing Coordinator' and a student Head of Wellbeing who provide options each week to do with students and also use 'My Mahi' in this context. Often Year 13 Whānau Form Tutors deliver Hui time activities and year-level tutors meet with Deans during this time.

Assemblies on Fridays are run by senior students and always include a slot relating to sustainability. The council have a 'Green Tip' on the screen as people enter, as we have found little bits often work well to reinforce learning and action. Our Sustainability Council organises an Environmental Week of activities and each year in Term 3 [we] have a Green Market for the community with all proceeds going to charity.

### *C-3.11 Brent—A Mainstream Secondary School Case Study*

In an article on the NZ Ministry of Education website (2020), the Innovation Stream at Brent's school is described as "an integrated curriculum designed to develop learners, leaders, and change-makers who use knowledge meaningfully across the core subjects of English, maths, science, and social studies". The curriculum focuses on the development of six innovation capabilities. Each has up to seven elements. In the following list I have selected one of these elements for each capability as an illustrative example:

- Self-management—e.g. Building resilience, empathy, confidence, humility and integrity.
- Global Leadership—e.g. Take an active role in this ever-changing world to address and explore issues such as sustainability, environment, enterprise, globalisation, ethics, and humanity understanding different viewpoints and ways of thinking.
- Communication—e.g. Develop competent verbal, nonverbal, written, visual and digital skills in a variety of contexts.
- Collaboration—e.g. Work co-operatively and collaboratively in teams to learn with and from others.
- Creativity—e.g. Ability to perceive the world in new ways, to find hidden patterns, to make connections between seemingly unrelated phenomena, and to generate solutions.
- Critical thinking—e.g. Apply problem-solving processes and evaluate data, facts, observations and research findings to solve issues and seek solutions (NZ Ministry of Education, 2020)

The Innovation Stream Curriculum (ISC) has many features in common with the Sustainable Wellbeing Metacurriculum (SWM). However, the two curricula differ in their underlying structures and the priority they accord their components. In both curricula, there is an emphasis on active inquiry and project-based problem-solving. Both the ISC and the SWM aspire to involve and weave together all the traditional disciplines through the creation of new subjects supported by teachers' cross-curricular collaboration. The ISC introduces four cross-curricular "subjects"—future studies, community action, creative design, and problem-solving—which students study instead of the traditional core subjects of English, mathematics, science, and social studies (NZ Ministry of Education, 2020). For the SWM, 'Sustainable Wellbeing' is treated as a new learning area and its domains and subdomains as new entire subjects.

There are four areas of significant difference between the two curricula. Whereas the ISC treats issues such as sustainability, environment, global warming, cultural awareness and democracy, as contexts for the development of students' capabilities the SWM places equal emphasis on students' understanding of global issues—their nature, origins, and interconnectedness; and on their development of the inter and intrapersonal competencies needed to effectively address those issues. Action competence (Eames et al., 2018) is specifically emphasised. Although these competencies have much in common with the ISC capabilities, they are organised under different broad headings. A more detailed comparison could identify gaps and potential improvements for both frameworks.

The establishment of the Innovation Stream required changes that affected many aspects of the school's built environment, social and professional systems, and culture. In the first Delphi round, Brent wrote:

> To implement our cross-curriculum junior program for 800 students we have had to change: buildings, timetables, leadership structures, faculty structures, teaching programmes, assessment approaches, faculty budgets, community expectations, reporting systems, teachers' minds and beliefs, and professional learning approaches. We ran a pilot for three years with 60 students and it will take another 5 years to implement fully to 900

Part of the implementation strategy involved requiring students to apply to be accepted for a limited number of places in the pilot programme which created an air of special status around this pioneering challenge.

> And the community … were quite clever here because they started off small, … with one class of 60 kids. And they got people to apply. This wasn't intentional,

> particularly, but they got students to apply. And so it became this sort of leadership thing. Oh, you know, were you accepted? Yes, I have. … But it's become a real thing in the community that they [ask] 'are you going to get into the cross-curricular innovation program?'

Thinking of the experience Anita had spoken of in her school I asked Brent if he had noticed any loss of achievement in mathematics for instance, in the Innovation Stream classes compared to their traditional subject-based classes. Quite the opposite, he replied.

> We do a post-mapping exercise [to see] that they still cover off their Maths, [and] English, because…, we need to make sure that they can still smash the NCEA. We've been doing it long enough now [to] see that the kids doing the cross-curricular program do better when it comes to pure maths, NCEA, than, those … kids in the mainstream program, … doing maths, English, Science separately.

I asked whether the Innovation Stream curriculum addresses social justice as an important element in humanity's adaptation to our environmental emergency and how the students respond to that message. He affirmed:

> That's, … exactly what our junior Innovation Programme focuses on, … and the skills required in order to, make change yourself, be the leaders of change. … They are way more [enthused by this programme ] than they are by mainstream. … I came into the school four years ago, when … we were just doing a pilot of the innovation programme. … my mission has been to upscale it .. because, we've got 900 year nine and tens …. So rather than having just 90 kids doing this, how can we have all 900?

When I asked if the school would extend this cross-curricular approach to the senior classes Brent did not respond directly at first to the question but instead explained how the Innovation Stream curriculum differs from the proposed SWM framework. He stressed that his school's emphasis is on developing student capabilities rather than on addressing the challenges of Sustainable Wellbeing directly.

> Yes, I guess in our perspective, the mission is about moving, teaching and learning from subject content, and skills to what we call capabilities, soft skills, … that's our motivator. So less on what you've listed here, in terms of domains. Our focus is more on the capabilities and the skills that would help you solve those problems.

The main challenge he had experienced as a professional leader was helping teachers to understand that the capabilities had to be taught explicitly. I asked what he meant exactly by capabilities. Are they the same thing as competencies, as the term is applied in the New Zealand curriculum (NZ Ministry of Education, 2007)?

> For us, global leadership, problem-solving, collaborating with others, critical thinking, you know, that's been the challenge in education and still is. Moving teachers who say, Oh, well, I already do that in my class. You know, I do group work. … I do collaboration; and saying, Well, no, you're not teaching collaboration, you're just doing it, and you can do it badly. And so what we want you to do, alongside teaching, about sustainability, and a topic, [is] also explicitly teach, you know, what is good collaboration? What is bad collaboration? … I don't want the

> first time our year 13s [are] judged … on their characteristics to be from a [post graduation] reference check. … You reference check someone and people say, oh, yeah, this person is terrible in a group, …. But no one's ever told them that in school. …, and explicitly develop[ed] it and report[ed] on it.

From the first Delphi Survey round, Brent had expressed qualified support for the three human-societal level domains of the SWM—Ecosphere, Social Justice, and Cultural Vision as the starting point for the co-construction of an SWM. Specifically, he saw the breadth and knowledge orientation of the domains as problematic. He wrote:

> The three domains are broad concepts that are useful as they allow flexibility for schools. However, breadth can also cause curricula that are just thematic links between traditional subjects - the old primary schools' approach of, this term we focus on the environment. The domains seem to have a knowledge foundation rather than a skill foundation or learning outcome. I would like to see a greater emphasis on soft skill/capability development communicated through the domain descriptors.

In the first Delphi Survey round the SWM framework already included the Individual Competency domains, based on the triad of Hands, Heart, and Head plus the 'Integrating-Self'. Brent's comment strongly influenced the development of the SWM framework subdomains and learning objectives following rounds 1 and 2. However, his comments above suggest that I had not communicated well enough the intimate synchronous fractal relationship between the intra and interpersonal competency domains level and the corresponding human-societal domains level implicit in the SWM framework.

Comments from other teachers also influenced me to be more explicit in the framework's domain and subdomain descriptors about the sustainability implications of climate change and biodiversity loss. When I asked Brent for his take on this emphasis, his response revealed an assumption that climate change and biodiversity could be reduced to the status of "topics" that traditional subjects might use as contexts to motivate the development of capabilities rather than, say, being the focal points for major ongoing projects for the students and the school. Brent favoured the development of capabilities over the understanding of and action to address environmental challenges.

> It's quite specific, … obviously, it's certainly a challenge at this point. I take … your idea that these things are meant to be changed and developed with the students. I mean, I guess I'd be questioning rather than climate change, biodiversity as a topic, what is the core skill underneath that students are going to need in order to work on climate change and biodiversity? You know, so, I mean, problem-solving, is the core skill really that fits beneath that. So, yeah, I get what people are saying climate change is important. But actually, in terms of education, probably what's more important is that we develop the core skills that students are going to need to tackle the problem,

The SWM framework gives the status of 'subjects' to its subdomains. The multiple aspects of climate change and biodiversity loss (amongst other major aspects of sustainability and wellbeing) are addressed through the subdomains. Students' competencies (capabilities) develop through their

engagement in learning and projects related to the subdomains as appropriate in each school's local context.

To address Brent's concern that the SWM domains and subdomains were merely thematic links between traditional subjects I attempted to clarify again the distinction between the Cross-Curricular Holistic (CCH) and Subject-Based Specialist (SBS) components of the timetable for students within the SWM framework. Eventually, I realised we were talking at cross purposes. For Brent, "Cross-Curricular" meant the strategy by which the school's Innovation Curriculum covered the four core subject areas of English, Mathematics, Science, and Social Studies in years 9 and 10. He responded to my explanation by saying:

> Ours is that model, but what [is] slightly different is that we create a new subject, so rather than just saying, We're going to stick maths with social sciences, and make some sort of thematic, link, we created a new subject called future studies, for example, that would be taught by the maths and social sciences, teachers, but you know, there's more to it than just those two curriculums, future studies in terms of their projects, or, or what they're focused on, is more than just the essence of those two courses.

What Brent describes here as creating a new subject is essentially what the SWM framework Domains and subdomains are intended to achieve but without prescribing which traditional subjects must contribute to each subdomain at each year level preferring to let that emerge from the collaboration of teachers in each school working in their local context. In effect, all teachers are being asked to add an education for Sustainable Wellbeing pedagogical knowledge to their existing subject speciality. 'Future Studies', as described on Brent's school's website, is one of the four Innovation Stream "courses" that systematically interlock pairwise with the four traditional core subject areas from the New Zealand Curriculum; English, Mathematics, Science, and Social Studies. Each course combines two of the core subjects but may also involve aspects of the Health and PE, Languages, Business, Arts, and Technology curricula. Future Studies, for instance, combines English and Science. The four courses and their four fixed paired core subject areas are conceived of as necessary components making up the complete Innovation Stream Curriculum. This built-in rigidity to the ISC may in part explain why the school has found it difficult to extend the programme beyond year eleven.

The following quote illustrates Brent's presumption that a CCH curriculum must be founded on the four core Learning Areas in a specific configuration. I asked if he thought they could offer a Sustainable Wellbeing Academy programme that a cohort of students could follow over three years. Brent described the timetabling challenges that he foresaw in extending the ISC into the senior school and reached the conclusion that any such curriculum would necessarily become "watered down". He replied:

> We do get that from [our] Innovation [Stream]. … And then they stay together in year 11. But probably we'd struggle in 12 just because by year 12, they're deciding on their pathways. So … the only way I could … see timetabling it is you could ask the kids in advance, those that were interested and then see what options … they pick and try and align them, … that's why it gets less and less in our school because you know, you can only really do four subjects. .... And even by year 12 You know, a lot of kids are dropping math by year 12, … and science so they might just take history and geography. So then the only other option is thematic. You ... could say everybody in year 12 is going to focus on an environmental theme, but it becomes much more watered down than true cross-curricula. … because … where do your

> languages fit? .., your computer concepts? Where does your woodwork fit? all those things.

I mentioned that the next stage of this study, the third Delphi round, would be asking teachers to make those connections between the SWM subdomains and particular subject areas. Brent felt that this approach would only lead to a weakening of content and academic rigour.

> … that just becomes a thematic link, which, in my experience can get watered down quite easily. There's a real difference between what we're doing in our cross-curricular innovation in 9 and 10, which is a real soft-skills-focused, project-based true cross-curricular programme.

The ISC also appears to be unnecessarily constrained in the way it limits the power of cross-curricular team teaching to require the constant simultaneous physical presence of collaborating teachers. I asked Brent whether they had considered smaller class sizes where the students remained in their class groups for all cross-curricular lessons. He replied:

> What you lose there is the collaboration between the teachers because that's probably the strongest part of the program … the teachers, your social science and your math teacher planning together. And, because the projects they're teaching are a combination of both subject-specific skills. They both need to be there.

As we have seen from the other SWM Units described in this chapter there are strategies for working around the students-per-teacher ratio limits, not requiring teachers' concurrent presence with large student groups, such as allocating adequate planning time outside of contact time, calling on senior students' leadership and agency, and involving external providers. The most significant aspect of this quote however is the value Brent places on teachers collaborating and planning their Units of instruction together. This is a key contrast with the school's "mainstream" SBS programme and must be a synergetic source of inspiration for those teachers who can work well together contributing to the student engagement and learning gains he has observed.

Another constraining aspect of the ISC design is that students must select either the CCH project-based ISC timetable or the mainstream SBS timetable. There is no combination option. The Innovation Stream programme was extended to year 11 in 2019 (NZ Ministry of Education, 2020) and as Brent admits:

> It goes through to 11 and 12. … But it's still a hard sell. ..and probably the hardest sell is that they're been taught in groups of 60 with two teachers. And some people see that as a chaotic, noisy environment. … That's something we're discussing. … In an ideal world, I guess you'd have three teachers. … but the environment is much noisier and project-based. And because there's still an alternative, there is still mainstream, kids will go home, in the first two weeks of year nine and say, particularly some of the maybe the brighter kids or the kids that are on the spectrum. And they'll say, it's too noisy,

He also observed that part of this classroom management problem is simply down to teachers' experience, skills and training.

I asked Brent how much interest he thought there might be in the SWM as he currently understood it amongst his school's leaders. He replied:

> Oh, huge amongst our school leaders. But … once you go down to the next level of heads of learning areas, and then teachers, completely different. … We've lost teachers along the way who are against the cross-curricular…, which is fine. I mean, we've been very upfront from the start. So this is our journey, you've got time to leave. Not many [did]. Probably the strongest thing is teaching in the program. Once people get into the program and teach it 99% are sold.

In 2017 when the ICS was first introduced the Associate Principal and the Director of the Innovation Stream presented their idea to the rest of the staff and asked those who may be interested to attend a meeting. They had 30% attendance, which was more than they expected. They observed that It seemed a risk for teachers at first as it requires a shift in mindset from traditional single-cell teaching, and team teaching is not very common in secondary schools (NZ Ministry of Education, 2020).

Arguably the greatest constraint on the continuation of the ISC beyond year 10 is the demand from the community for academic success in the senior school particularly accreditation for University Entrance (UE) in years 12 and 13. Students require 14 level 3 NCEA credits in each of three approved subjects to gain University Entrance in New Zealand. These approved subjects can all be in one or two learning areas, e.g. Science and Mathematics. This subject specialisation requirement for UE would be more challenging to meet if students were also expected to undertake level 3 subject-based learning across the four core learning areas of English, Mathematics, Social Studies, and Science. From the first Delphi Survey round Brent challenged the viability of the SWM framework for years 11 to 13 based on the difficulty of aligning its domain and competency goals with students attaining UE. He wrote: "How can we integrate these [sustainable wellbeing] concepts but still keep UE results high as this is what our community wants?"

Ultimately the disciplinary siloed nature of University faculties, reflected in their entrance requirements, is the key constraint on cross-curricular programmes for secondary school students aspiring to University study. It should be noted however that this group is less than half of all students. In 2021 the exact percentage of school leavers gaining the University Entrance qualification in New Zealand was 40.8% and in 2020, 44.2% (Education Counts, 2023). Qualifications in six Vocational Pathways requiring only NCEA level 2 standards (but also linked to appropriate UE level 3 standards) are also available to students. The six pathways are: Creative Industries; Primary Industries; Service Industries; Social and community services; Construction and Infrastructure; and Manufacturing and Technology. For this reason, I have included both NCEA level 2 and UE attainment in Table 6-13 "The eight Case Study schools …", (Section 6.4) which compares the nine core participants' schools according to their proximity and direction of travel relative to the education attractor SWM configuration.

I asked Brent if he had ever attempted units for senior academic students where they were asked to integrate material from different learning areas to address sustainability issues and were acknowledged for that integration with NCEA credits, for example, with the Education for Sustainability (EfS) achievement standards which are approved for UE within the Science learning area. He expressed frustration at the difficulty experienced in attempting that integration within the existing subject-siloed senior curriculum.

> ,... I have in my career, but not recently, outside of year 11. Because it is ridiculous. I mean, you will get year 13 kids at the top levels, who are doing classics, research projects, in classics, research projects in English and research projects in science all at the same time. But they're not linked. … Obviously, the skill we're trying to teach them it's research.

The fragmented uncoordinated nature of the NCEA standards is one difficulty but again, timetable structures and the subject choice that students expect are also problematic. He continued:

> My partner's a health teacher. We've tried to put health and English together, for example. Slightly harder than we thought, because there are just so many silly little criteria in the standards, that you have to meet. Doable but …

Then timetable problems can arise with third subjects that only some of the students want to take.

> .. from a timetable perspective, you have to make sure that all your Health kids are in the same English class. .... Which then becomes an issue because you know, there might only be one dance class. So if you want all those kids and health and English, and the dance class happens to be in the same line as that one English class, that's going to link with that health, it can't happen. So that's, that's really the crux of this, in terms of the cross-curricular stuff at senior school. are you going to say to kids, you're picking a package … of these three things, which will only leave you ... free to pick two other options?

This is almost what the SWM proposes, although the Cross-Curricular Holistic 'package' it suggests would be the equivalent of two timetable lines comprising a limited number of specific CCH Sustainable Wellbeing courses—perhaps only one in tear 11—that all students would have to select from. The other three lines could then be allocated to traditional Subject-Based Specialisation options with a reduced total number of lessons per subject. Brent described two alternative timetabling strategies he was aware of. The Academy strategy provides a package of core subjects to a group of students with common interests who remain together for most of their lesson times. The Impact Project strategy—as adopted at Mathew's (Section 5.3.2, Appendix C-3.2) and Anita's schools (Section 5.3.3, Appendix C-3.3)—ring-fences a portion of the timetable for all students to be involved in projects of their choosing. The Academy strategy works best if the group is willing to take at least four subjects in common. Anything less than that means providing students with the options they want "becomes a timetabling mission" Brent explained and added:

> Where we have been more successful is year 12, [where] we've got a sports and education program. Those guys go all the way from year nine … up to year 12 together, and, they will do their English, math, science and PE. So they'll do four together.

I suggested to him that all year thirteen students could be encouraged to undertake a whole-year project in one domain. He responded:

> I've seen schools do that like Albany. [They] have a Wednesday iTime [Impact Project Time], where they do a project, for half a year or a year. But when it comes to senior school, it either has to be a standalone thing, like the Itime project scenario in small groups or it has to be four core subjects.

The Impact Project strategy is closer to what is envisaged in the SWM proposal. The weekly timetable for Albany Senior High that Brent mentions, copied directly from the school's website, is shown in Figure C-2 (Albany Senior High School, 2021) and resembles Mathew's (Figure C-1) and Anita's (Table 5-5) school timetables.

The Albany Senior High Impact Project vision is compatible with the values and goals of the SWM. Student projects at the school for instance include titles such as 'Model City Design', 'Young Ocean Explorers 21 Day Challenge', '"Albany Clean Up" project', which would fall within the SWM framework subdomains of 'Cultural Evolution and Individual Agency', 'Kaitiaki Guardians' and 'Maker-Recyclers' respectively. However, the school's values and campus practices—as presented on the school's website—do not explicitly centre Sustainability and Wellbeing and the projects do not appear to be purposefully guided by a comprehensive education for sustainability and wellbeing framework.

*Figure C-2 Albany Senior High school Timetable 2021— Another Example of a bi-modal CCH-SBS timetable strategy involving Impact Projects as the cross-curricular component of a senior secondary school timetable*

<table>
<tr><th></th><th>Monday</th><th>Tuesday</th><th>Wednesday</th><th>Thursday</th><th>Friday</th></tr>
<tr><td colspan="2">8.50 - 9.00<br>Prep Time</td><td></td><td>9.30 - 9.50<br>Prep Time</td><td colspan="2">8.50 - 9.00<br>Prep Time</td></tr>
<tr><td>9.00 - 10.40</td><td>Specialist Subject (1)</td><td>Tutorial</td><td>9.50-10.40<br>Impact Project</td><td>Tutorial</td><td>Specialist Subject (5)</td></tr>
<tr><td colspan="6">Morning Tea 10.40 - 11.00</td></tr>
<tr><td>11.00-12.40</td><td>Specialist Subject (2)</td><td>Specialist Subject (4)</td><td>Impact Project</td><td>Specialist Subject (1)</td><td>Specialist Subject (3)</td></tr>
<tr><td colspan="6">Lunch 12.40 - 13.30</td></tr>
<tr><td>1.30-3.10</td><td>Specialist Subject (3)</td><td>Specialist Subject (5)</td><td>1.30-2.20<br>Impact Project<br>2.20-3.10<br>Impact Project</td><td>Specialist Subject (2)</td><td>Specialist Subject (4)</td></tr>
</table>

How effectively a teacher considered their school to be addressing sustainability issues in each of the SWM framework human-societal subdomains is a subjective, comparison-free, context-dependent judgement as previously noted from Mathew, Anita, and Deb's evaluations in sections C-3.2, C-3.3, and C-3.6. The judgement depends not only on individual interpretations of "effective" but also on the relative educational significance accorded the subdomains themselves. In the second Delphi round, Brent identified the 'Kaitiaki Guardians' and 'Our Cultural Inheritance' as the only two of the nine subdomains that his school was not "effectively addressing" in its year 11 to 13 curriculum. In his interview, I asked Brent if he thought that the subdomains aligned with what his school was covering in its ISC. He replied:

> Oh 100%? And, you know, some of our subdomains? You know, your subdomains are covered …, we've just got different names for them....

But then he added:

> I guess the only thing I thought about this framework, it's you know, it's obviously very heavily focused on environmental issues.

When I pointed out that six of the subdomains are directed toward Social Justice and Cultural Vision he conceded “Yeah, true., True, actually. Yeah. Okay”

Despite our misunderstandings over terminology and apparent differences about the educational significance of sustainability challenges, relative to student capabilities, there were several such moments of realisation and convergence in our interview where Brent reconsidered aspects of the SWM proposal in light of their alignment with what the school was already doing. For instance, the subdomains of the SWM framework are designed to foster purposeful connection across all the subdomains relevant to the place-based context of Sustainable Wellbeing projects. I asked Brent how he would describe his school’s commitment to sustainability. “Huge” was his response. In justifying his enthusiasm he began to see the potential for amplifying that commitment by systematically coordinating environmental projects currently being undertaken in isolated subject silos across the school, saying:

> We're one of the few secondary schools that have [become] a gold enviro school … Silver and Bronze [are] a bit more sort of, your recycling programs, [but] gold is actually about your curriculum. … one of the lead teachers on the environmental projects did a … mapping exercise of every single project or curriculum topic …, and it was incredible to see what's going on there. …, I suppose, talking about it now, that might be a starting point that we would look [at], going back to that document that mapped out all these different topics and try and link them together.

It should be noted that the New Zealand Enviroschools Bronze, Silver and Green Gold awards are based on a set of self-check criteria provided by the organisation which rely entirely on schools self-assessing against those criteria (Enviroschools, 2019).

Although Brent prioritised students’ soft skills and capabilities over sustainability issues, which he referred to as “topics”, he conceded that not all topics were of equal significance.

> … And so that I guess, that's our focus, in terms of the topics laid over the top [of capabilities]. In some respects, [it] doesn't matter, although I can certainly see that some things are more important than others.

I suggested to him that students “absolutely” need those capabilities if they are to do anything about sustainability and wellbeing issues, but they also have to decide which issues are most urgent and the specifics of the challenges they present if their capabilities are to be effectively directed. Brent responded:

> True. Yeah, you're right. It's interesting having this conversation … how entrenched we are in current content and current silos. And that, … We're quite a forward-thinking school, … taking risks with timetable and things like that. But, you know, it's still a real mission to challenge those things.

## C-4 Supplementary Unit Goals

### *C-4.1 Place-Based Goals*

The Subdomain Goals are intended to provide teachers with a non-prescriptive range of exemplar goals for each of the SWM subdomains as starting points for their own Sustainable Wellbeing curriculum design. While this intention resulted in them being broad assemblage-type statements, they could still not, of course, cover all possibilities. For that reason teachers were given the option—in the Delphi 3 template—of also defining their own Place-Based Unit Goals. Only Mathew and Deb took that opportunity.

For 'Business Studies–Level 2', Mathew added the Goal:

- Apply business knowledge to critical problems in a large business context

This goal gives subject-based specificity to the Anchoring Subdomain Goal he chose for the Unit, i.e.

EC3–Understand the physical and anthropogenic basis and implications of climate change; share personal emotional responses and challenges; and investigate local, national, and global opportunities for mitigation and adaptation including the attainment of carbon neutrality goals in your school.

Mathew's Place-based goal resembles the title of one of the National Certificate of Educational Achievement (NCEA) standards used to assess this Unit, i.e. 90844 Demonstrate understanding of how a large business responds to external factors (see Appendix C-7.1.2). It goes further by mentioning "critical problems" but without explicitly referencing problems relating to sustainability and Wellbeing.

Deb anchored her project 'Harsh Summer' in the 'Maker-Recyclers' subdomain of the Ecosphere domain and selected the Subdomain Goal:

EE2–Explore, Share, and develop the skills to imagine, design, and build sustainable technologies including, Eco-housing/cities, Eco-transport, Eco-clothing and Eco-communication infrastructure for Aotearoa New Zealand.

She agreed that it could be adequately assessed using existing NCEA standards but "Somewhat disagreed" that this goal accurately describes key aspects of what she wants students to achieve in this project. She provided two succinct Place-Based Goals. The first was:

- to understand why they need to protect themselves and their community from the summer environment

Deb associated this goal with the same SWM Subdomain as EE2, 'Maker-Recyclers' but "Strongly Disagreed" that it is assessable within the scope of the NCEA achievement standards chosen to accredit this course (see Appendix C-7.4.2). Instead, her students are assessed against this goal "Through their discussions with the teacher around the introductory material".

Deb selected one Connecting Subdomain Goal from the 'Whanau and Community' Subdomain: SE3–Understand how wellbeing relates to the harmony of physical, social, mental, emotional and spiritual elements in life as described for instance, by Durie's Te Whare Tapa Wha model (Durie, 2009) and the alignment between Te Whare Tapa Wha and the SWM.

She was the only one of the Delphi-3 teachers who "Disagreed" that this Goal could be adequately assessed using existing NCEA standards. Perhaps if Deb had been working in a more collaborative collegial environment she might have found she could've assessed this goal through coordination with

a Health and PE colleague using an NCEA achievement standard such as 91237 'Take action to enhance an aspect of people's well-being within the school or wider community'.

Deb's second Place-Based Goal—also associated with the 'Whanau and Community' Subdomain—was:

- to support their community and ensure sustainability

She "Agreed" that this goal is assessable within the scope of the NCEA achievement standards she used with this course and added that it would also be assessed for her students "Through the feedback gained from their end users".

### *C-4.2 United Nations Sustainable Development Goals*

The SWM framework also enables teachers to define Sustainable Wellbeing Goals (SWG) based on "investigating, critiquing, and taking action related to" the United Nations (UN) Sustainable Development Goals. Four teachers commented on this option in the Delphi survey round 3. Their selections are shown in Table C-2 along with their Unit's Title and its Anchoring Subdomain.

The cells in this table coloured green show Agreement with the statement "This/These SWG can be assessed and accredited by within, or across available NCEA standards", red shows Disagreement and grey shows "Neither Agree nor Disagree". There was some consensus about the assessability of the SWGs based on the UN Sustainable Development Goals. Twelve of the SDGs were ignored or expressly excluded by all four teachers and only three were considered NCEA assessable by more than one teacher: the three Ecosphere related SDGs 13, 14, and 15.

Deb was the only teacher to comment on specific possible NCEA standards, in the Delphi-3 survey, that might be used to assess these Sustainable Development (SD)-related goals. For SDG 3 she suggested, "possibly health standards. Supporting students wellbeing through inclusive practice". The level 2 standard 91237 suggested above could fit this description but there are also other Health and Physical Education standards at NCEA levels 1 and 3 that align well with SDG 3. Deb also pointed out that SDG 4 "is similar to the Vision statement in the NZC framework" and despite her negative response about the NCEA assessment of SDG 13—Take urgent action to combat climate change and its impacts—she suggested "Possibly science standards [would] Work with recycling projects which will include the impact on the environment."

To the best of my knowledge, there are no existing NCEA standards that explicitly mention Climate Change in their title. "Climate" is not provided as a Keyword on the New Zealand Qualification Authority's (NZQA) website "Search Standards & Assessment" page. The level 1 Science achievement standard 90945, 'Investigate implications of the use of carbon compounds as fuels' is perhaps the most obviously related to anthropogenic climate change but then the Environmental Sustainability standard 90810 'Undertake a personal action, with reflection, that contributes to a sustainable future' and also 90828 'Evaluate a personal action that contributes towards a sustainable future' are more likely candidates. Both of these standards are used by Tara and Daniel in their SWM Units (see Appendices C-7.3.2 and C-7.5.2 respectively).

Although Nicola and Rebecca did not use the SWM framework Unit planning template themselves, they advocated for the use of the SDGs in the development of the SWM framework in earlier rounds of the study and were specific about which SDGs would be associated with each of the SWM Domains. In the second Delphi Survey round, after rating the overall usefulness of the nine subdomains at the Human and Societal level for thinking about Unit design for Sustainable Wellbeing Education, as "Very Good", Nicola commented:

I would like to see each [sub]domain reference the SDGs. The SWM Framework could include possible cross-curricular links so that it can be embedded in different ways depending on individual school decisions about how much of the curriculum is given over to SWM. If the sub-domains identified potential links, there may be greater leverage to persuade the decision-makers to integrate SWM.

*Table C-2 Sustainable Wellbeing Goals related to the UN Sustainable Development Goals (SDG) selected by four teachers for their SWM Units. The Anchoring Subdomain for each Unit is shown under its title. Goals that they Agreed could be assessed using existing NCEA standards are shown in Green, those that could not are shown in red, and 'Neither Agree nor Disagree' is shown in grey.*

| **Investigate, critique, and take action related to the UN Sustainable Development Goals …:** | | **Mathew: Business Studies-Level 2 [EC]** | **Tara: AGE Adventure [ES]** | **Deb: Harsh Summer [EE]** | **Daniel: Urban Farming Outreach [ES]** |
|---|---|---|---|---|---|
| **SDG** | **Anchoring Subdomain** | **Kaitiaki Guardians** | **Re-generative-Cultivators** | **Maker-Recyclers** | **Re-generative-Cultivators** |
| 1 | No Poverty | | | | |
| 2 | Zero hunger | | | | |
| 3 | Good health and well-being | | | | |
| 4 | Quality education | | | | |
| 5 | Gender equality | | | | |
| 6 | Clean water and sanitation. | | | | |
| 7 | Affordable and clean energy | | | | |
| 8 | Decent work and economic growth | | | | |
| 9 | Industry, innovation and infrastructure | | | | |
| 10 | Reduced inequalities | | | | |
| 11 | Sustainable Cities and Communities | | | | |
| 12 | Responsible consumption and production | | | | |
| 13 | Climate action | | | | |
| 14 | Life below water | | | | |
| 15 | Life on land | | | | |
| 16 | Peace, justice and strong institutions | | | | |
| 17 | Partnership for the Goals | | | | |

Table C-3 provides a matrix—based on Nicola and Rebecca's suggestions and Table C-2—that clarifies the relationship between the SWM Subdomains and the UN SDGs. This relationship was not the subject of any direct question to the study participants at any stage of the research. It should be noted

that the potential links represented in Table C-3, are open to individual interpretation and are not intended to be definitive. For instance, SDG 3 'Good health and well-being', could arguably be associated with all nine SWM subdomains just as some teachers viewed SDG 13 'Climate action'. The notion that all subdomains ultimately 'contain' all others is implicit in the fractal conception of the SWM framework. The same principle could be applied to the UN SDGs but the SDG's have been conceived as a list, i.e. analytically whereas the SWM framework is designed to facilitate Synthesis in its Cross-Curricular Holistic (CCH) mode. That there is so little direct association between the SDGs and the SWM Subdomains, however, illustrates the fundamental differences in the theoretical principles underlying these two conceptual systems.

The median number of SWM Subdomains per SDG is four. Only one SDG is associated with the minimum of just two SWM Domains; i.e. SDG 2-Zero Hunger with 'Regenerative-Cultivators' and 'Whanau and Community'. Only three SDGs are associated with a single SWM Domain; i.e. 14-Life below water and 15-Life on land with the Ecosphere, and 1-No poverty with the Social-Justice Domain. Three of the SDGs are associated with all nine Subdomains: 8-Decent work and economic growth, 13-Climate action, and 17-Partnership for the Goals. The inclusion of "economic growth" SDG 8 is problematic for the SWM, which adopts the strong rather than the weak version of sustainability (Cartwright et al., 2009) and is one of the reasons these SWGs related to the UN's SDGs are prefaced with the phrase "Investigate, critique, and take action related to the UN Sustainable Development Goals …" in Table C-2.

The most striking difference between the SWM Subdomains and the UN SDGs is the absence of any explicit reference to diverse worldviews or Cultural perspectives in the meaning of 'Sustainable Development' in the UN SDGs. There are no SDGs related solely to the Cultural Vision Domains and none that pair connection with nature—the Ecosphere—with the Cultural Vision Domain and indigenous worldviews. The five pillars of the UN SDG—People, Planet, Prosperity, Peace and Partnership (United Nations Sustainable Development Group, 2022)—seem to assume that Sustainable Development is a universally accepted and well-understood fundamental value in all cultures.

*United Nations Sustainable Development Goals Summary*

Sustainable Wellbeing Goals related to the UN SDGs were defined by four teachers for their Units. Only five of the seventeen goals were selected by two or more teachers. They were:

- SDG 3. Ensure healthy lives and promote well-being for all at all ages.
- SDG 13. Take urgent action to combat climate change and its impacts.
- SDG 14. Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.
- SDG 15. Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
- SDG 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable, and inclusive institutions at all levels.

Of these five, there was a majority Agreement that SDGs 13, 14, and 15, all of which are strongly associated with the SWM Ecosphere Domain, could be assessed using existing NCEA standards. Daniel expressed an opinion about Goals 1, 2, 4, and 6 to 12 none of which he felt could be assessed using NCEA standards, as shown in Table C-2.

*Table C-3 Correspondences between the 9 Sustainable Wellbeing Metacurriculum (SWM) Subdomains and the 17 United Nations' Sustainable Development Goals*

| | | Ecosphere | | | Social Justice | | | Cultural Vision | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SDG** | **Short Title** | **Maker-Recyclers—EE** | **Regenerative-Cultivators—ES** | **Kaitiaki Guardians—EC** | **Whanau and Community—SE** | **Equity, Rights and Responsibilities—SS** | **Power and Influence—SC** | **Our cultural inheritance—CE** | **Others' cultures and World views—CS** | **Cultural Evolution and Individual Agency—CC** | **Total Subdomains** |
| 1 | No Poverty | | | | ■ | ■ | ■ | | | | 3 |
| 2 | Zero hunger | | ■ | | ■ | | | | | | 2 |
| 3 | Good health and well-being | ■ | ■ | ■ | ■ | | | | | | 4 |
| 4 | Quality education | | | | | ■ | ■ | ■ | ■ | ■ | 5 |
| 5 | Gender equality | | | | ■ | ■ | ■ | ■ | ■ | ■ | 6 |
| 6 | Clean water and sanitation. | | ■ | ■ | | ■ | | | | | 3 |
| 7 | Affordable and clean energy | ■ | | | | ■ | ■ | | | | 3 |
| 8 | Decent work and economic growth | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 9 |

| | | Ecosphere | | | Social Justice | | | Cultural Vision | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SDG** | **Short Title** | **Maker-Recyclers—EE** | **Regenerative-Cultivators—ES** | **Kaitiaki Guardians—EC** | **Whanau and Community—SE** | **Equity, Rights and Responsibilities—SS** | **Power and Influence—SC** | **Our cultural inheritance—CE** | **Others' cultures and World views—CS** | **Cultural Evolution and Individual Agency—CC** | **Total Subdomains** |
| 9 | Industry, innovation and infrastructure | | | | | | | | | | 3 |
| 10 | Reduced inequalities | | | | | | | | | | 5 |
| 11 | Sustainable Cities and Communities | | | | | | | | | | 3 |
| 12 | Responsible consumption and production | | | | | | | | | | 4 |
| 13 | Climate action | | | | | | | | | | 9 |
| 14 | Life below water | | | | | | | | | | 3 |
| 15 | Life on land | | | | | | | | | | 3 |
| 16 | Peace, justice and strong institutions | | | | | | | | | | 4 |
| 17 | Partnership for the Goals | | | | | | | | | | 9 |
| | **Total SDG** | **6** | **7** | **5** | **6** | **6** | **9** | **6** | **6** | **6** | |

## C-5 SWM Units Subdomains and NZC Achievement Objectives Links

Included in the framework template in the Delphi round 3 survey was a hierarchical multi-choice section listing all the New Zealand Curriculum (NZC) Achievement Objectives for all learning areas from levels 5 to 8 (approximately ages 14 to 18) of the curriculum. Four teachers, Mathew, Tara, Deb, and Daniel used this facility to help define their Sustainable Wellbeing Metacurriculum (SWM) Units. Table C-4 displays the number of Achievement Objectives the teachers selected for their Units by NZC level, and Table C-5 shows how these Achievement Objectives were distributed by Learning Area and Strand of the curriculum.

The SWM Units are shown on the left side of Table C-4 with their anchoring subdomains colour-coded in conformity with previous tables. All four Units are in the Ecosphere domain. The column labelled 'Connections', refers to the number of Domains and Subdomains (in that order) that were nominated as 'Connected' to the Unit's Sustainable Wellbeing (SW) goals, as shown earlier in Table 5-8. The numbers of Achievement Objectives (AOs) by NZC level are shown on the right side of the table. The column headed 'Essential/Useful' shows the number of AOs considered to be essential (red background) or simply useful (blue background) to their Unit goals. Fifty-five AOs overall (22%) were considered to be "Essential" with the remainder described as "Useful".

Most (92%) of the NZC Achievement Objectives selected are at the lower levels 5 and 6 of the NZC with only forty being at level 7 and four at level 8. This pattern was similar for the Objectives described as "Essential" and those described as merely "Useful". Although these four Units are designed for years 11 to 13 students and only Deb's 'Harsh Summer' was aimed purely at year 11, the median NZC level of the Objectives selected for these four SWM Units was 6, the NZC level usually associated with year 11 students. This leaning toward the lower curriculum level could be due to the cross-curricular, nature of the SWM Units and the need to adapt teaching to the prior learning of all students across all learning areas. It might also be due to AOs at higher levels of the NZC, in Learning Areas outside of Social Science and Health and Physical Education, being more strongly subject-specialist in orientation, and lacking any explicit suggestion in their phrasing of inherent links to Sustainable Wellbeing subdomains.

The level 7 and 8 AOs selected by Tara and Daniel—both of whose Units are Anchored in the 'Regenerative-Cultivators' Subdomain—are also well aligned with the Social Justice and Cultural Vision domains of the SWM framework. Tara chose Language, and Health & Physical Education Objectives at level 7 from the Strands of:

- Healthy communities and environments
- Personal health and physical development, and
- Relationships with other people

Daniel chose Objectives from the Social Science Strands of Economics, Geography, History, and Social Studies Objectives at levels 7 and 8, including:

- Level 8 Geography—Understand how people's diverse values and perceptions influence the environmental, social, and economic decisions and responses that they make, and
- Level 8 Social Studies—Understand how ideologies shape society and that individuals and groups respond differently to these beliefs.

The complete list of Tara and Daniel's Achievement Objective choices is shown in Appendices C-7.3.1 and C-7.5.1 respectively.

*Table C-4 Four SWM Units and the number of New Zealand Curriculum (NZC) Achievement Objectives (AO) selected by NZC level. 'Connections' refers to the number of Connected Domains and Subdomains (in that order) per Unit. The number of AO considered Essential (red) and Useful (blue) are also shown.*

| SWM Units | | | | NZC Achievement Objectives | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | NZC Level | | | | Essential | |
| Teacher | SWM Unit | SWM Anchor Subdomain | Con nect-ions | L5 | L6 | L7 | L8 | Useful | Grand Total |
| **Mathew** | Business Studies-L2 [EC] | Kaitiaki Guardians | 2, 4 | | 22 | | | 6 | 22 |
| | | | | | | | | 16 | |
| **Tara** | AGE Adventure [ES] | Regenerative-Cultivators | 3, 4 | 86 | 69 | 36 | | 36 | 191 |
| | | | | | | | | 155 | |
| **Deb** | Harsh Summer [EE] | Maker-Recyclers | 1, 1 | 18 | 13 | | | 13 | 31 |
| | | | | | | | | 18 | |
| **Daniel** | Urban Farming Outreach [ES] | Regenerative-Cultivators | 3, 8 | | | 4 | 4 | 8 | 8 |
| **Grand Total** | | | | **104** | **104** | **40** | **4** | | **252** |

This sample of just four SWM Units is too small and narrow—in terms of the SWM Anchoring Subdomains represented—to support strong conclusions about possible correlations between the SWM's nine Subdomains and the NZC's Learning Areas. However, Table C-5 includes all eight learning areas reflecting the broad cross-curricular nature of the SWM framework and it also suggests a relationship between the Ecosphere Domain as a whole and the Learning Areas of Technology, Science, Mathematics, and Social Science which accounted for 38%, 15%, 13%, and 11%, respectively (77% collectively) of the total number of Achievement Objectives selected. While Social Science and Technology AOs featured in three Units and Mathematics in two, the Science AOs were chosen only by Tara for her 'AGE Adventure' Unit. All eight NZC Learning Areas appear in Table C-5, but here again, five were selected only by Tara. Mathew, Deb, and Daniel chose objectives from no more than three Learning Areas and Deb from only one, but they and Tara also, selected a range of Connected SWM Domains and Subdomains to explore in their Units outside of their Anchoring Ecosphere Subdomain—as shown in Table 5-8 and Table C-4—which demonstrates their use of the complete SWM framework and the holistic intention of all four Units.

Mathew, Tara, and Deb "Somewhat Agreed" that the NZC Achievement Objectives they selected for their Units are well assessed and accredited by currently available National Certificate of Educational Achievement (NCEA) standards. Daniel "Neither Agreed nor Disagreed". The way these teachers see the relationship between the SWM Subdomains and traditional school subjects is significantly expanded when we look at the NCEA standards they and Anita and her colleagues chose for the assessment of their Units.

*Table C-5 Number of NZC Achievement Objectives—both Essential and Useful—selected by Teachers for their Units by Learning Area and New Zealand Qualification Authority (NZQA) Domain*

| NZC Learning Area / Strand | Teacher: SWM Unit | Mathew: Business Studies-Level 2 [EC] | Tara: AGE Adventure [ES] | Deb: Harsh Summer [EE] | Daniel: Urban Farming Outreach [ES] | Grand Total |
|---|---|---|---|---|---|---|
| | SWM Anchor Domain | Kaitiaki Guardians | Regenerative -Cultivators | Maker-Recyclers | Regenerative -Cultivators | |
| **The Arts** | | | | | | |
| Visual arts | | | 11 | | | 11 |
| **Total** | | | **11** | | | **11** |
| **English** | | | | | | |
| Listening, reading, and viewing | | | 9 | | | 9 |
| Speaking, writing, and presenting | | | 9 | | | 9 |
| **Total** | | | **18** | | | **18** |
| **Health & PE** | | | | | | |
| Healthy communities and environments | | | 6 | | | 6 |
| Movement concepts and motor skills | | | 4 | | | 4 |
| Personal health and physical development | | | 8 | | | 8 |
| Relationships with other people | | | 8 | | | 8 |
| **Total** | | | **26** | | | **26** |
| **Languages** | | | | | | |
| Communication | | | 1 | | | 1 |
| Cultural knowledge | | | 1 | | | 1 |
| Language knowledge | | | 1 | | | 1 |
| **Total** | | | **3** | | | **3** |
| **Mathematics** | | | | | | |
| Geometry and measurement | | 1 | 14 | | | 15 |
| Number and algebra | | 4 | 11 | | | 15 |
| Statistics | | 1 | 3 | | | 4 |
| **Total** | | **6** | **28** | | | **34** |
| **Science** | | | | | | |
| Living World | | | 7 | | | 7 |
| Material world | | | 7 | | | 7 |
| Nature of science | | | 15 | | | 15 |

| NZC Learning Area / Strand | Teacher: SWM Unit | Mathew: Business Studies-Level 2 [EC] | Tara: AGE Adventure [ES] | Deb: Harsh Summer [EE] | Daniel: Urban Farming Outreach [ES] | Grand Total |
|---|---|---|---|---|---|---|
| | SWM Anchor Domain | Kaitiaki Guardians | Regenerative -Cultivators | Maker-Recyclers | Regenerative -Cultivators | |
| Physical world | | | 3 | | | 3 |
| Planet Earth and beyond | | | 6 | | | 6 |
| **Total** | | | **38** | | | **38** |
| **Social Science** | | | | | | |
| Economics | | 2 | 2 | | 1 | 5 |
| Geography | | 1 | 2 | | 2 | 5 |
| History | | 2 | 1 | | 4 | 7 |
| Social studies | | 2 | 7 | | 1 | 10 |
| **Total** | | **7** | **12** | | **8** | **27** |
| **Technology** | | | | | | |
| Computational thinking for digital technologies | | | 2 | | | 2 |
| Design and visual communication | | 1 | 19 | 7 | | 27 |
| Designing and developing digital outcomes | | 2 | | 2 | | 4 |
| Designing and developing materials outcomes | | 4 | 15 | 12 | | 31 |
| Designing and developing processed outcomes | | 2 | 19 | 10 | | 31 |
| **Total** | | **9** | **55** | **31** | | **95** |
| **Grand Total** | | **22** | **191** | **31** | **8** | **252** |

## C-6 SWM Unit Subdomains and NCEA Standards Links

The National Certificate of Educational Achievement (NCEA) is the main form of school-leaving qualification in New Zealand and arguably of greater consequence for students than the New Zealand Curriculum (NZC) Achievement Objectives in determining their subject choices in years 11 to 13. Specific NCEA standards used for the assessment of student achievement were listed by five teachers for six of the nine Sustainable Wellbeing Metacurriculum (SWM) Units and these lists are reproduced in full in Appendix C-7. The following two tables display the number of NCEA Standards selected by Teachers for their Units—Table C-6 by Level and Standard Type and Table C-7 by Learning Area and NZQA Domain.

*Table C-6 The number of NCEA Standards selected by Teachers for their Units (in the left-hand columns) by Level and Standard Type: Achievement Standard (AS) and Unit Standard (US), (in the right-hand columns)*

| Teacher | SWM Unit | SWM Anchor Domain | No. Connected SWM Domains, Subdomains | Std type | NCEA Level 1 | NCEA Level 2 | NCEA Level 3 | Grand Total |
|---|---|---|---|---|---|---|---|---|
| **Mathew** | Business Studies-Level 2 [EC] | Kaitiaki Guardians | 2, 4 | AS | | 3 | | 3 |
| **Anita** | Education for Sustainability [SS] | Equity, Rights, and Responsibilities | 3, 3 | AS | 5 | | | 5 |
| **Anita** | Āhuarangi Climate [EC] | Kaitiaki Guardians | 3, 8 | AS | 4 | | | 4 |
| | | | | US | 3 | | | 3 |
| **Tara** | AGE Adventure [ES] | Regenerative-Cultivators | 3, 4 | AS | 8 | 3 | 2 | 13 |
| | | | | US | 1 | | | 1 |
| **Deb** | Harsh Summer [EE] | Maker-Recyclers | 1, 1 | AS | 2 | | | 2 |
| **Daniel** | Urban Farming Outreach [ES] | Regenerative-Cultivators | 3, 8 | AS | | 1 | 1 | 2 |
| | | | | US | | 6 | 5 | 11 |
| **Grand Total** | | | | | **23** | **13** | **8** | **44** |

Achievement Standards (AS) are used in the NCEA to accredit academic achievement. They are awarded with a grade level, Excellence, Merit, Achieved, or Not Achieved. Unit Standards (US) are used to accredit the achievement of Vocational skills. They are usually graded as simply Achieved or Not Achieved although a few also have an associated Merit or Excellence grade to recognise performance in the unit standard outcomes. Standards of both types earn credits toward the NCEA qualifications. NCEA levels 1 to 3 correspond roughly to levels 6 to 8 of the NZC.

In 2022, 21% of all NCEA levels 1 to 3 Standards assessed were US (New Zealand Qualification Authority, 2023b). Fifteen (34%) of the Standards listed in Table C-6 are US which suggests a leaning toward Vocational skills assessment in these predominantly Ecosphere-Action oriented SWM Units. It should also be noted however that only three of the six Units used US and 11 of the fifteen US belong to Daniel's explicitly vocational Unit 'Urban Farming Outreach'.

*Table C-7 The number of NCEA Standards selected by Teachers for their Units by Learning Area and New Zealand Qualification Authority (NZQA) Domain*

| Learning Area / NZQA Domain | Teacher: SWM Unit | Mathew: Business Studies-Level 2 [EC] | Anita: Education for Sustainability [SS] | Tara: AGE Adventure [ES] | Deb: Harsh Summer [EE] | Daniel: Urban Farming Outreach | Anita: Āhuarangi Climate [EC] | Grand Total |
|---|---|---|---|---|---|---|---|---|
| | SWM Anchor Domain | Kaitiaki Guardians | Equity, Rights, and | Regenerative-Cultivators | Maker-Recyclers | Regenerative-Cultivators | Kaitiaki Guardians | |
| **Health and Physical Education** | | | | | | | | |
| First Aid | | | | 1 | | | | 1 |
| Health Education | | | 1 | 4 | | | | 5 |
| **Total** | | | **1** | **5** | | | | **6** |
| **Science** | | | | | | | | |
| Apiculture | | | | | | 4 | | 4 |
| Biology | | | | | | | 2 | 2 |
| Fruit Production | | | | | | 1 | | 1 |
| Nursery Production | | | | | | 2 | | 2 |
| Physics | | | | | | | 1 | 1 |
| Production Horticulture | | | | | | 4 | | 4 |
| Science - Core | | | 1 | | | | 1 | 2 |
| **Total** | | | **1** | | | **11** | **4** | **16** |
| **Social Sciences** | | | | | | | | |
| Business Studies | | 3 | | | | | | 3 |
| Environmental Sustainability | | | | 4 | | 2 | | 6 |
| Geography | | | 1 | | | | | 1 |
| Social Studies | | | 2 | | | | | 2 |
| Work and Study Skills | | | | | | | 3 | 3 |
| **Total** | | **3** | **3** | **4** | | **2** | **3** | **15** |
| **Technology** | | | | | | | | |
| Construction and Mechanical Technologies | | | | 2 | 1 | | | 3 |
| Generic Technology | | | | 3 | 1 | | | 4 |
| **Total** | | | | **5** | **2** | | | **7** |
| **Grand Total** | | **3** | **5** | **14** | **2** | **13** | **7** | **44** |

The distribution of Standards across levels shows the same, although less extreme, leaning toward the lower levels observed for the NZC Achievement Objectives in Table C-4. The distribution of standards offered across levels 1 to 3 is 52%, 30%, and 18% which can be compared to the distribution of all the numbers of standards attempted nationally by all students in aggregate which in 2022 was 43%, 35%, and 23% (New Zealand Qualification Authority, 2023b).

The range of learning areas covered by NCEA standards in these six units is also more restricted than by the NZC Achievement Objectives for just four of them in Table C-5. The Social Sciences and Technology learning areas are prominent again in Table C-7 as they are in Table C-5 but Science, almost absent from the NZC Achievement Objective choices of teachers, is the most important NCEA Learning Area for these Units followed by Social Sciences, Technology, and Health and Physical Education. All four Learning Areas have contributed to at least two Units. Six of the level three standards were Subject-Based Specialist (SBS) Unit standards in Apiculture, Nursery Production, and Production Horticulture chosen by Daniel for his 'Urban Farming Outreach' Unit. The other two were the Education for Sustainability achievement standards 90828 and 91735—previously mentioned in Section 5.4.3 which also appear in Appendices C-4.2 and C-7.5.2—which are Cross-Curricular Holistic (CCH) in nature.

The number of standards used in each Unit varies from as few as two for 'Harsh Summer' up to thirteen and fourteen for 'Urban farming outreach' and 'AGE Adventure' respectively. Only four of the forty-four standards listed are used in more than one SWM Unit, i.e.,

the NCEA level 2 and 3 standards used in both 'Urban Farming Outreach' and 'AGE Adventure':

- 90810 Undertake a personal action, with reflection, that contributes to a sustainable future and
- 90828 Evaluate a personal action that contributes towards a sustainable future,

The NCEA Level 1 Health Education standard:

- 90971 Take action to enhance an aspect of personal well-being,
  is used in both 'Education for Sustainability' and 'AGE Adventure' and

the level 1 Technology standard:

- 91047 Undertake development to make a prototype to address a brief
  is used in both 'Harsh Summer' and 'AGE Adventure'.

# C-7 SWM Units—Linked NZC Achievement Objectives and NCEA standards

This appendix contains the details of the New Zealand Curriculum (NZC) Achievement Objectives and the National Certificate of Educational Achievement (NCEA) standards for six of the nine Sustainable Wellbeing Metacurriculum (SWM) Units introduced in Chapter 5. Claire did not reach the point of defining these details for her Unit 'Working Title'. Nicola—'Self-watering planter boxes', and Rebecca—'Te Ara year 12' didn't provide specific Objectives and Standard numbers but did give some indications of their assessment intentions.

## *C-7.1 Mathew—Business Studies–Level 2*

### *C-7.1.1 NZC Achievement Objectives Links*

Mathew selected twenty-two NZC Achievement Objectives as relevant to the 'Business Studies–Level 2' course. All were at level 6 of the curriculum from three learning areas, Mathematics, Social Science, and Technology. He described six objectives as "Essential" and sixteen as "Useful". The six Essential objectives are shown in Table C-8 listed by NZC level, Learning Area, and Strand.

*Table C-8 Essential NZC Level Six Achievement Objectives for the Unit: Business Studies–Level 2*

**NZC Level Six**

**Mathematics**

**Statistics**

Evaluate statistical reports in the media by relating the displays, statistics, processes, and probabilities used to the claims made.

**Social Science**

**History**

Understand how people's perspectives on past events that are of significance to New Zealanders differ.

Understand how the causes and consequences of past events that are of significance to New Zealanders shape the lives of people and society.

**Social studies**

Understand how cultures adapt and change and that this has consequences for society.

Understand how individuals, groups, and institutions work to promote social justice and human rights.

**Technology**

**Designing and developing materials outcomes**

Brief development: Justify the nature of an intended outcome in relation to the need or opportunity and justify specifications in terms of key stakeholder feedback and wider community considerations.

### *C-7.1.2 NCEA standards Assessment*

Mathew selected three level 2 NCEA Achievement standards to assess 'Business Studies Level 2'. Standard 90844 is the only Externally assessed standard among all the standards selected by the teachers for the eight SWM Units. All three are described by Mathew as "Could be Shared with other Projects/Courses" rather than "Essential within this Project/Course". In 2022, the school replaced the

Level 2 standard 90848 with the Level 3 standard 91384 and the Level 2 standard 91868 was also added to this course as shown in Table C-9 and Table C-10.

*Table C-9 NCEA Level 2 standards for assessment of the Unit: Business Studies Level 2. *90848 was replaced by the Level 3 standard **91384 in 2022 and ***91868 was also added to the course.*

**NCEA Level 2**

| | | |
|---|---|---|
| **Social Sciences** | | |
| **Business Studies** | | |
| | 90844 | Demonstrate understanding of how a large business responds to external factors |
| | 90846 | Conduct market research for a new or existing product |
| * | 90848 | Carry out, review and refine a business activity within a community context with guidance |
| *** | 91868 | Demonstrate understanding of cash flow forecasting for a business |

*Table C-10 NCEA* Level 3 *standards for assessment of the Unit: Business Studies Level 2. **91384 replaced the Level 2 standard *90848 in 2022.*

**NCEA Level 3**

| | | |
|---|---|---|
| **Social Sciences** | | |
| **Business Studies** | | |
| ** | 91384 | Carry out, with consultation, an innovative and sustainable business activity |

## *C-7.2 Anita—Education for Sustainability*

### *C-7.2.1 NCEA standards Assessment*

Anita selected five NCEA level 1 internally assessed Achievement Standards for her Unit 'Education for Sustainability' as listed in Table C-11. She considered all five to be "Essential within this Course".

*Table C-11 NCEA standards for assessment of the Unit: Education for Sustainability*

**NCEA Level 1**

**Health and Physical Education**

**Health Education**

90971 Take action to enhance an aspect of personal well-being

**Science**

**Science - Core**

90951 Investigate the biological impact of an event on a New Zealand ecosystem

**Social Sciences**

**Geography**

91009 Demonstrate geographic understanding of the sustainable use of an environment

**Social Studies**

91042 Report on personal involvement in a social justice and human rights action

91043 Describe a social justice and human rights action

## *C-7.3 Tara—AGE Adventure*

### *C-7.3.1 NZC Achievement Objectives Links*

Tara made the most extensive use of the NZC Achievement Objectives option in the SWM Unit planning template. She marked 36 as Essential across the three levels, and 155 as Useful. The Essential Objectives are displayed in Table C-12 (NZC level 5), Table C-13 (NZC level 6), and Table C-14 (NZC level 7).

Tara's choices highlight the cross-curricular connections that are built into the NZC Aos. For instance "Healthy communities and environments" within the Health and Physical Education curriculum, and "socio-scientific issues" within the NZC level 5 Science curriculum. The NZC Achievement Objectives also have multiple intersections with the SWM competencies, such as the NZC level 6 Health and Physical Education Objective "Interpersonal skills: Plan strategies and demonstrate interpersonal skills to respond to challenging situations appropriately." with the SWM Inter-personal competency "Awareness of and support for the physical wellbeing of others. E.g. Reducing Community carbon footprint."

*Table C-12 Essential NZC Level Five Achievement Objectives for the Unit: AGE Adventure*

**NZC Level Five**

**English**

**Listening, reading, and viewing**

Show an understanding of ideas within, across, and beyond texts.

**Speaking, writing, and presenting**

Integrate sources of information, processes, and strategies purposefully and confidently to identify, form, and express increasingly sophisticated ideas.

## NZC Level Five

Select, develop, and communicate purposeful ideas on a range of topics.

### Health & PE

**Healthy communities and environments**

People and the environment: Investigate and evaluate aspects of the school environment that affect people's well-being and take action to enhance these aspects.

Societal attitudes and values: Investigate societal influences on the well-being of student communities.

**Movement concepts and motor skills**

Positive attitudes: Develop skills and responsible attitudes in challenging physical situations.

Safety management: Investigate and practise safety procedures and strategies to manage risk situations.

### Mathematics

**Geometry and measurement**

Select and use appropriate metric units for length, area, volume and capacity, weight (mass), temperature, angle, and time, with awareness that measurements are approximate.

### Science

**Nature of science**

Communicating in science: Use a wider range of science vocabulary, symbols, and conventions.

Develop an understanding of socio-scientific issues by gathering relevant scientific information in order to draw evidence-based conclusions and to take action where appropriate.

### Social Science

**Social studies**

Understand how economic decisions impact on people, communities, and nations.

Understand how people's management of resources impacts on environmental and social sustainability.

Understand how systems of government in New Zealand operate and affect people's lives, and how they compare with another system.

Understand how the ideas and actions of people in the past have had a significant impact on people's lives.

### Technology

**Design and visual communication**

Characteristics of technological outcomes: Understand that technological outcomes are fit for purpose in terms of time and context. Understand the concept of malfunction and how "failure" can inform future outcomes.

Technological products: Understand how materials are selected, based on desired performance criteria.

**Designing and developing materials outcomes**

Characteristics of technological outcomes: Understand that technological outcomes are fit for purpose in terms of time and context. Understand the concept of malfunction and how "failure" can inform future outcomes.

Technological products: Understand how materials are selected, based on desired performance criteria.

**Designing and developing processed outcomes**

Characteristics of technological outcomes: Understand that technological outcomes are fit for purpose in terms of time and context. Understand the concept of malfunction and how "failure" can inform future outcomes.

## NZC Level Five

Technological products: Understand how materials are selected, based on desired performance criteria.

*Table C-13 Essential NZC Level Six Achievement Objectives for the Unit: AGE Adventure*

## NZC Level Six

### English

**Speaking, writing, and presenting**

Integrate sources of information, processes, and strategies purposefully and confidently to identify, form, and express increasingly sophisticated ideas.

Select, develop, and communicate connected ideas on a range of topics.

### Health & PE

**Movement concepts and motor skills**

Positive attitudes: Demonstrate and examine responsible attitudes in challenging physical situations.

**Personal health and physical development**

Safety management: Demonstrate understanding of responsible behaviours required to ensure that challenges and risks are managed safely in physical and social environments.

**Relationships with other people**

Interpersonal skills: Plan strategies and demonstrate interpersonal skills to respond to challenging situations appropriately.

### Mathematics

**Geometry and measurement**

Apply the relationships between units in the metric system, including the units for measuring different attributes and derived measures.

Measure at a level of precision appropriate to the task.

**Number and algebra**

Find optimal solutions, using numerical approaches.

### Science

**Living world**

Investigate the impact of natural events and human actions on a New Zealand ecosystem.

**Nature of science**

Use a wider range of science vocabulary, symbols, and conventions.

**Planet Earth and beyond**

Develop an understanding of how the geosphere, hydrosphere, atmosphere, and biosphere interact to cycle carbon around Earth.

### Technology

**Designing and developing processed outcomes**

Planning for practice: Critically analyse their own and others' past and current planning practices in order to make informed selection and effective use of planning tools. Use these to support and justify ongoing planning that will see the development of an outcome through to completion.

*Table C-14 Essential NZC Level Seven Achievement Objectives for the Unit: AGE Adventure*

## NZC Level Seven

### Health & PE

**Healthy communities and environments**

Community resources: Evaluate school and community initiatives that promote young people's well-being and develop an action plan to instigate or support these.

**Personal health and physical development**

Safety management: Analyse the difference between perceived and residual risks in physical and social environments and develop skills and behaviour for managing responsible action.

**Relationships with other people**

Identity, sensitivity, and respect: Analyse the beliefs, attitudes, and practices that reinforce stereotypes and role expectations, identifying ways in which these shape people's choices at individual, group, and societal levels.

Interpersonal skills: Evaluate information, make informed decisions, and use interpersonal skills effectively to manage conflict, competition, and change in relationships.

### *C-7.3.2 NCEA standards Assessment*

Tara listed thirteen Internally assessed achievement standards and one Unit standard for use within the context of the 'AGE Adventure' Project. In a follow-up email she also described some standards as 'Essential' and others as 'Useful', as shown in Table C-15. She qualified these choices with the following comment.

> Whilst we are in the infancy stages of the project this year we won't be offering beyond level 1 technology as we assess the need for a specialist teacher in this space. In the future, I'm keen to have outdoor Ed standards but we don't currently have consent to assess these, nor the specialist teachers to deliver them. That's about as far as we have got with generic offerings - each of our learners have a programme tailored to their strengths and interests so could include English, Maths (Level 1) or Stats (Level 2), Biology (Level 2), Media Studies etc.

*Table C-15 NCEA standards for the assessment of the Unit: AGE Adventure*

## NCEA Level 1

### Health and Physical Education

#### First Aid

| | | |
|---|---|---|
| 6402 | Provide basic life support | Useful |

#### Health Education

| | | |
|---|---|---|
| 90971 | Take action to enhance an aspect of personal well-being | Essential |
| 90973 | Demonstrate understanding of interpersonal skills used to enhance relationships | Essential |
| 91097 | Demonstrate understanding of ways in which well-being can change and strategies to support well-being | Useful |

### Technology

#### Construction and Mechanical Technologies

| | | |
|---|---|---|
| 91061 | Demonstrate understanding of basic concepts related to structures | Useful |
| 91062 | Demonstrate understanding of basic concepts related to machines | Useful |

#### Generic Technology

| | | |
|---|---|---|
| 91044 | Undertake brief development to address a need or opportunity | Essential |
| 91046 | Use design ideas to produce a conceptual design for an outcome to address a brief | Essential |
| 91047 | Undertake development to make a prototype to address a brief | Essential |

## NCEA Level 2

### Health and Physical Education

#### Health Education

| | | |
|---|---|---|
| 91237 | Take action to enhance an aspect of people's well-being within the school or wider community | Useful |

### Social Sciences

#### Environmental Sustainability

| | | |
|---|---|---|
| 90810 | Undertake a personal action, with reflection, that contributes to a sustainable future | Essential |
| 91734 | Develop a collaborative response that promotes a sustainable future, in relation to a current issue | Useful |

## NCEA Level 3

### Social Sciences

#### Environmental Sustainability

| | | |
|---|---|---|
| 90828 | Evaluate a personal action that contributes towards a sustainable future | Essential |
| 91735 | Evaluate measures that may be taken to sustain and/or improve a biophysical environment | Essential |

## *C-7.4 Deb—Harsh Summer*

### *C-7.4.1 NZC Achievement Objectives Links*

Deb listed thirteen Achievement Objectives as Essential and eighteen as Useful for the Project 'Harsh Summer' across NZC levels 5 and 6. The Essential Objectives are listed in Table C-16 and Table C-17.

*Table C-16 Essential NZC Level Five Achievement Objectives for the Unit: Harsh Summer*

**NZC Level Five**

**Technology**

**Design and visual communication**

Outcome development and evaluation: Analyse their own and others' outcomes to inform the development of ideas for feasible outcomes. Undertake ongoing functional modelling and evaluation that takes account of key stakeholder feedback and trialling in the physical and social environments. Use the information gained to select and develop the outcome that best addresses the specifications. Evaluate the final outcome's fitness for purpose against the brief.

Technological products: Understand how materials are selected, based on desired performance criteria.

**Designing and developing materials outcomes**

Outcome development and evaluation: Critically analyse their own and others' outcomes to inform the development of ideas for feasible outcomes. Undertake ongoing experimentation and functional modelling, taking account of stakeholder feedback and trialling in the physical and social environments. Use the information gained to select, justify, and develop a final outcome. Evaluate this outcome's fitness for purpose against the brief and justify the evaluation, using feedback from stakeholders.

Technological products: Understand how materials are selected, based on desired performance criteria.

**Designing and developing processed outcomes**

Outcome development and evaluation: Analyse their own and others' outcomes to inform the development of ideas for feasible outcomes. Undertake ongoing functional modelling and evaluation that takes account of key stakeholder feedback and trialling in the physical and social environments. Use the information gained to select and develop the outcome that best addresses the specifications. Evaluate the final outcome's fitness for purpose against the brief.

Technological products: Understand how materials are selected, based on desired performance criteria.

*Table C-17 Essential NZC Level Six Achievement Objectives for the Unit: Harsh Summer*

**NZC Level Six**

**Technology**

**Design and visual communication**

Outcome development and evaluation: Critically analyse their own and others' outcomes to inform the development of ideas for feasible outcomes. Undertake ongoing experimentation and functional modelling, taking account of stakeholder feedback and trialling in the physical and social environments. Use the information gained to select,

## NZC Level Six

justify, and develop a final outcome. Evaluate this outcome's fitness for purpose against the brief and justify the evaluation, using feedback from stakeholders.

Technological products: Understand how materials are formed, manipulated, and transformed in different ways, depending on their properties, and understand the role of material evaluation in determining suitability for use in product development.

**Designing and developing materials outcomes**

Characteristics of technology: Understand the interdisciplinary nature of technology and the implications of this for maximising possibilities through collaborative practice.

Outcome development and evaluation: Critically analyse their own and others' outcomes to inform the development of ideas for feasible outcomes. Undertake ongoing experimentation and functional modelling, taking account of stakeholder feedback and trialling in the physical and social environments. Use the information gained to select, justify, and develop a final outcome. Evaluate this outcome's fitness for purpose against the brief and justify the evaluation, using feedback from stakeholders.

Technological products: Understand how materials are formed, manipulated, and transformed in different ways, depending on their properties, and understand the role of material evaluation in determining suitability for use in product development.

**Designing and developing processed outcomes**

Outcome development and evaluation: Critically analyse their own and others' outcomes to inform the development of ideas for feasible outcomes. Undertake ongoing experimentation and functional modelling, taking account of stakeholder feedback and trialling in the physical and social environments. Use the information gained to select, justify, and develop a final outcome. Evaluate this outcome's fitness for purpose against the brief and justify the evaluation, using feedback from stakeholders.

Technological products: Understand how materials are formed, manipulated, and transformed in different ways, depending on their properties, and understand the role of material evaluation in determining suitability for use in product development.

### *C-7.4.2 NCEA standards Assessment*

Deb chose two NCEA level 1 Internally assessed Achievement standards for the assessment of the Unit 'Harsh Summer' as shown in Table C-18.

*Table C-18 NCEA standards for the assessment of the Unit: Harsh Summer*

## NCEA Level 1

### Technology

#### Construction and Mechanical Technologies

91058 Implement basic procedures using textile materials to make a specified product

#### Generic Technology

91047 Undertake development to make a prototype to address a brief

## *C-7.5 Daniel—Urban Farming Outreach*

### *C-7.5.1 NZC Achievement Objectives Links*

Daniel marked no NZC Achievement Objectives as "Essential" but considered eight Social Science objectives from levels 7 & 8 as "Useful" as shown in Table C-19 and Table C-20.

*Table C-19 Useful NZC Level Seven Achievement Objectives for the Unit: Urban Farming Outreach*

**NZC Level Seven**

**Social Science**

**Economics**

Understand how government policies and contemporary issues interact.

**Geography**

Understand how people's perceptions of and interactions with natural and cultural environments differ and have changed over time.

**History**

Understand how historical forces and movements have influenced the causes and consequences of events of significance to New Zealanders.

Understand how people's interpretations of events that are of significance to New Zealanders differ.

*Table C-20 Useful NZC Level Eight Achievement Objectives for the Unit: Urban Farming Outreach*

**NZC Level Eight**

**Social Science**

**Geography**

Understand how people's diverse values and perceptions influence the environmental, social, and economic decisions and responses that they make.

**History**

Understand how trends over time reflect social, economic, and political forces.

Understand that the causes, consequences, and explanations of historical events that are of significance to New Zealanders are complex and how and why they are contested.

**Social Studies**

Understand how ideologies shape society and that individuals and groups respond differently to these beliefs.

### *C-7.5.2 NCEA standards Assessment*

Daniel uses thirteen NCEA Level 2 and Level 3 Standards for the assessment of the 'Urban Farming Outreach' Project as shown in Table C-21 and Table C-22. Eleven are vocationally oriented Unit standards and two are academic Achievement standards. All are internally assessed. The Unit standards are all from the science learning area and the Achievement standards are from the Environmental Sustainability domain of the Social Sciences learning area.

*Table C-21 NCEA Level 2 standards for the assessment of the Unit: Urban Farming Outreach*

## NCEA Level 2

### Science

#### Apiculture

30783 Open and close beehives under close supervision

30791 Demonstrate understanding of honey bee physical features, castes, bee stings and beehive health

#### Fruit Production

21212 Harvest a fruit crop under supervision

#### Nursery Production

29492 Care for a nursery crop under close supervision

#### Production Horticulture

29502 Plant out by hand

29504 Prick-out seedlings or rooted cuttings, transplant, and pot-on young plants into containers

### Social Sciences

#### Environmental Sustainability

90810 Undertake a personal action, with reflection, that contributes to a sustainable future

*Table C-22 NCEA Level 3 standards for the assessment of the Unit: Urban Farming Outreach*

## NCEA Level 3

### Science

#### Apiculture

30798 Demonstrate knowledge of bees, the bee lifecycle and adult bee behaviour patterns

30843 Identify and describe beehive construction equipment, and construct and repair beehives

#### Nursery Production

27705 Select, collect and prepare seeds for plant propagation purposes

#### Production Horticulture

22186 Select and harvest a horticulture crop

29838 Plant and care for plants

### Social Sciences

#### Environmental Sustainability

90828 Evaluate a personal action that contributes towards a sustainable future

## *C-7.6 Anita, Adam, and Ben—Āhuarangi Climate*

### *C-7.6.1 NCEA standards Assessment*

Anita, Adam, and Ben use eleven NCEA Level 1 standards in their assessment of student learning in their 'Āhuarangi Climate' course, as listed in Table C-23. Eight are Achievement standards and three are Unit standards for Literacy.

Anita's views on NCEA and alternative forms of assessment for the SWM have been already presented in Section C-7.2.

*Table C-23 NCEA standards for the assessment of the Unit: Āhuarangi Climate*

**NCEA Level 1**

| | |
|---|---|
| **Health and Physical Education** | |
| **Health Education** | |
| 90971 | Take action to enhance an aspect of personal well-being |
| **Science** | |
| **Biology** | |
| 90925 | Carry out a practical investigation in a biological context, with direction |
| 90926 | Report on a biological issue |
| **Physics** | |
| 90935 | Carry out a practical physics investigation that leads to a linear mathematical relationship, with direction |
| **Science - Core** | |
| 90951 | Investigate the biological impact of an event on a New Zealand ecosystem |
| 90953 | Demonstrate understanding of carbon cycling |
| **Social Sciences** | |
| **Social Studies** | |
| 91042 | Report on personal involvement in a social justice and human rights action |
| 91043 | Describe a social justice and human rights action |
| **Work and Study Skills** | |
| 26622 | Write to communicate ideas for a purpose and audience |
| 26624 | Read texts with understanding |
| 26625 | Actively participate in spoken interactions |

### *C-7.7 Nicola—Self-watering planter boxes*

#### *C-7.7.1 NCEA standards Assessment*

Nicola did not specify exactly which NCEA standards she covered in this Unit but did describe the learning areas from which the level 1 standards were drawn for her year 11 students. The students, she said, could gain up to "22 credits across Science Investigation, Understanding a sci-scientific issue, Technology, Horticulture, Numeracy and Literacy. The students then wrote a report that covered all the standards".

### *C-7.8 Rebecca—Te Ara year 12*

#### *C-7.8.1 NCEA standards Assessment*

As explained in Section 5.3.10, the 'Te Ara–Year 12' Unit is assessed without involving any NCEA standards even though the course content is closely related to the level 2 Education for Sustainability standards.

## C-8 New Zealand School Student Levels

The education sector in Aotearoa New Zealand uses several age-related level schemes for students. The following Table C-24 shows the alignment of student age with school year levels, the New Zealand Curriculum (NZC) level ranges, and National Certificate of Educational Achievement (NCEA) levels..

*Table C-24 New Zealand alignment of student age with school year levels, The New Zealand Curriculum (NZC) levels, and National Certificate of Educational Achievement (NCEA) levels*

| Age (years) | Year | NZC | NCEA |
|---|---|---|---|
| 5 - 6 | 1 | 1 - 1 | |
| 6 - 7 | 2 | 1 - 2 | |
| 7 - 8 | 3 | 1 - 2 | |
| 8 - 9 | 4 | 2 - 3 | |
| 9 - 10 | 5 | 2 - 3 | |
| 10 - 11 | 6 | 2 - 4 | |
| 11 - 12 | 7 | 3 - 5 | |
| 12 - 13 | 8 | 3 - 5 | |
| 13 - 14 | 9 | 4 - 5 | |
| 14 - 15 | 10 | 4 - 6 | |
| 15 - 16 | 11 | 5 - 7 | 1 |
| 16 - 17 | 12 | 5 - 8 | 1-2 |
| 17 - 18 | 13 | 6 - 8 | 1-3 |

# Appendix D for Chapter 6: A Sustainable Wellbeing Metacurriculum for Aotearoa New Zealand Secondary Schools

## D-1 School demographics

### *D-1.1 Comparing the Study and All-Other schools*

#### *D-1.1.1 Total School Roll*

The median school roll for the 22 Study schools (824), is almost double that for the 505 All-Other schools (421) as shown in Figure D-1. This difference sounds dramatic but is only what would be expected of a representative sample of the entire population of schools given that the research design was based on sampling the population of NZ secondary school teachers, not schools. Schools with larger rolls and a proportionately greater number of teachers naturally have a greater probability of being included.

Both school roll distributions are skewed upwards by a few very large schools, the All-Other schools more so than the Study schools which is reflected in the fact that both means are well above the corresponding medians. Despite the Study group having a much higher median roll, the two distributions have a similar overall shape and almost identical standard deviations which suggests that in terms of their total rolls, the Study schools are representative of the overall target population of schools experienced by teachers. This impression is further confirmed by the median total school rolls experienced by students.

When schools are ordered by the size of their total roll, the calculated median total roll experienced by students in the Study schools is 1,027 while for the All-Other schools, it is 1,039 as shown in Figure D-2 Student-level Total roll comparison of the 22 Study schools with the 505 Non-Study senior-secondary-student-inclusive schools.. When students are ordered by the Total Roll of the school they attend, the median student Total Roll will always be equal to or greater than the median school Total Roll. The difference between these medians depends on the distribution of Total Rolls across schools. Increasing either the standard deviation or the skew of the distribution increases the difference between the school median and the student-experienced median. There is no statistically significant difference and from a student perspective, no meaningful difference, between the Study and the All-Other schools' median student-experienced Total rolls.

From the All-Other schools' distributions in Figure D-1 and Figure D-2 Student-level Total roll comparison of the 22 Study schools with the 505 Non-Study senior-secondary-student-inclusive schools., it is clear that most students are in schools with total rolls well above that of the majority of schools, i.e. the total rolls administered by most schools' Senior Leadership Team (SLT). This is a consequence of the distinct upward skew of the school distribution. The median student-experienced school total roll (1,039) is between 1,047 and 1,161 while the median school total roll (421) is between 376 and 466. These ranges are 95% confidence intervals calculated using the method of Informal Confidence Intervals which is valid for skewed normal distributions (Wild et al., 2017; Wild, Horton, et al., 2011; Wild, Pfannkuch, et al., 2011).

This asymmetry between the school and student levels of analysis is also evident among the Study-schools although to a lesser degree. By comparing the Study-schools school-level median total roll in Figure D-1, (824 and 690 to 957, with 95% confidence) with the All-Other school median student-experienced school total roll quoted above, we see that more than half of all students are in schools with total rolls above that of most of the Study schools.

*Figure D-1 School-level Total roll comparison for the 22 Study schools with the 505 Non-Study senior-secondary-student-inclusive schools.*

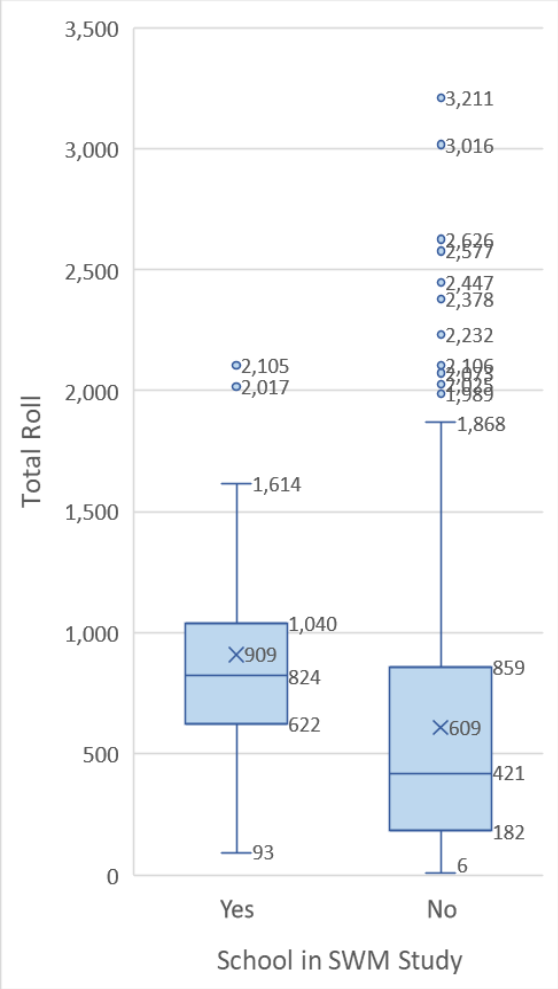
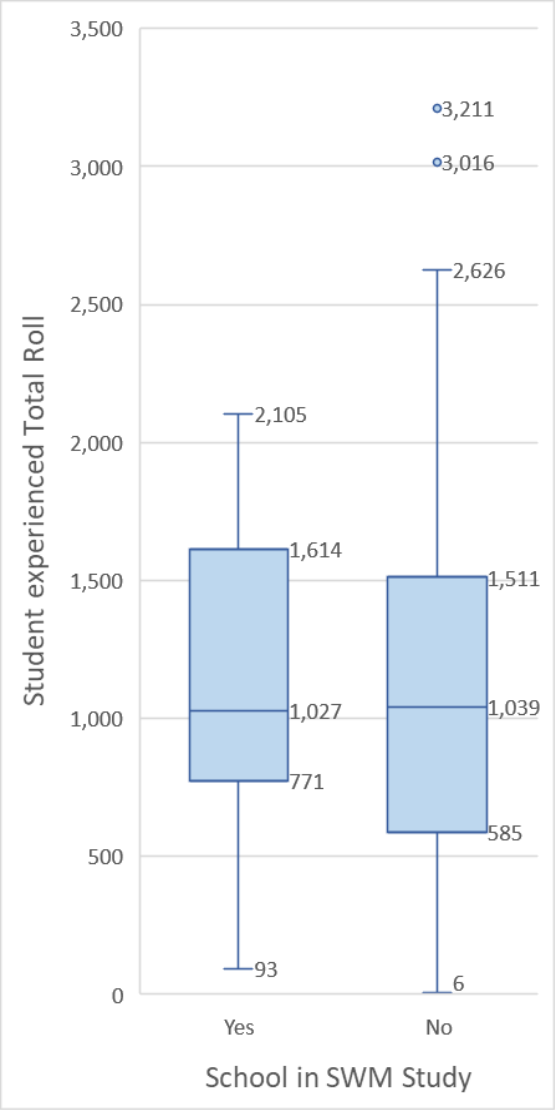



*Figure D-2 Student-level Total roll comparison of the 22 Study schools with the 505 Non-Study senior-secondary-student-inclusive schools.*




The fact that the Study Schools' distribution is noticeably less upwardly skewed than the All-Other Schools' distribution raises the possibility that there may be increasing constraints on teachers—who might otherwise volunteer for a study such as this—related to the size of their school roll above a certain level. The smaller upward skew means that very large schools may be underrepresented in the Study, even though individual teachers' self-selection for this study meant that larger schools were more likely to be included. Applying appropriate tests for the significance of skewness (S. Brown, 2022) to each of these distributions establishes that while the All-Other group

does indeed have a strong upward skew almost double that of the Study group, the latter is too small a sample to establish, with at least 95% confidence, that the difference is statistically significant.

### *D-1.1.2 Gender of Students*

The 527 senior-secondary-student-inclusive schools can be placed into one of three gender categories using the New Zealand Ministry of Education (MoE) directory: i.e. Co-Ed, Boys-only, and Girls-only schools. The number of Girls-only schools in the Study group is more than double what would be expected from their numbers across the country as a whole. Co-Ed schools are 20% underrepresented while Boys-only schools are equally represented in both the Study and All-Other groups. The actual numbers are shown in Table D-1 and the proportions within the Study and All-Other groups of schools are shown in Table D-2. The probability of this bias occurring purely by chance is 4.6% based on the Fisher Exact test (2-tailed) for contingency tables.

*Table D-1 The numbers of Co-Ed, Boys, and Girls schools in the Study and All-Other groups of secondary student-inclusive schools*

| | **Study Schools** | **All-Other Schools** | **Total** |
|---|---|---|---|
| Co-Ed | 14 | 407 | 421 |
| Boys | 2 | 44 | 46 |
| Girls | 6 | 54 | 60 |
| **Total** | **22** | **505** | **527** |

*Table D-2 The proportions of Co-Ed, Boys, and Girls schools in the Study and All-Other groups of secondary student-inclusive schools*

| | **Study Schools** | **All-Other Schools** | **Total** |
|---|---|---|---|
| Co-Ed | 64% | 81% | 80% |
| Boys | 9% | 9% | 9% |
| Girls | 27% | 11% | 11% |
| **Total** | 100% | 100% | 100% |

School Gender type is somewhat correlated with Total roll numbers. The girls-only schools are more numerous (60 cf. 46 boys-only) but also have a lower average roll size (755 cf. 921 for boys-only). Table D-3 shows that the bias toward female students in the study group of schools at the level of individual students is comparable to that at the whole school level.

*Table D-3 The proportions by Total roll numbers of students in Co-Ed, Boys only, and Girls only schools in the Study and All-Other groups of secondary student-inclusive schools*

| | Study Schools | All-Other Schools | Total |
|---|---|---|---|
| Co-Ed | 64% | 74% | 73% |
| Boys | 10% | 13% | 13% |
| Girls | 26% | 13% | 14% |
| **Total** | 100% | 100% | 100% |

Although the total number of students in girls' schools is about equal to that in boys', the proportion of students in single-sex girls' schools in the Study group (26%), is almost twice that of the overall population of senior secondary student-inclusive schools (14%). Again, Co-Ed schools are underrepresented in the Study group, in this total roll numbers comparison, compared to their overall numbers. Since Co-Ed schools have very nearly equal proportions of girls and boys, we can infer that the Study group has a bias toward female students of around 58% compared to 42% of male students.

### *D-1.1.3 Student Ethnicity proportions*

Of the Total 327,642 students in the 527 senior secondary student-inclusive schools, 48% identify as European/Pākehā, 24% as Māori, 15% as Asian, 9% as Pacifika and 5% as other ethnicities. As a point of reference for the individual school-based comparisons that follow these overall students population ethnic proportions are shown in Table D-4 along with the corresponding proportions within each of the Study and All-Other groups of schools.

*Table D-4 Student population Ethnic proportions across the 527 senior secondary student-inclusive schools and within the Study and All-Other groups of schools*

| | Study Schools | All-Other Schools | Overall |
|---|---|---|---|
| European/Pākehā | 60% | 47% | 48% |
| Māori | 20% | 24% | 24% |
| Asian | 10% | 15% | 15% |
| Pacifika | 7% | 9% | 9% |
| Other Ethnicities | 3% | 5% | 5% |
| **Total** | 100% | 100% | 100% |

The school culture that students experience is determined not only by overall population ethnic proportions but also by their interaction with the relative proportions of student ethnicities within schools, Total school rolls and the correlation of Roll size with school ethnic proportions. European/Pākehā students comprise the largest Ethnic group. They do not have an overall majority. but are substantially overrepresented in the Study schools group as a whole while all other ethnicities are somewhat underrepresented. There is a tendency for many schools' ethnic proportions profile to

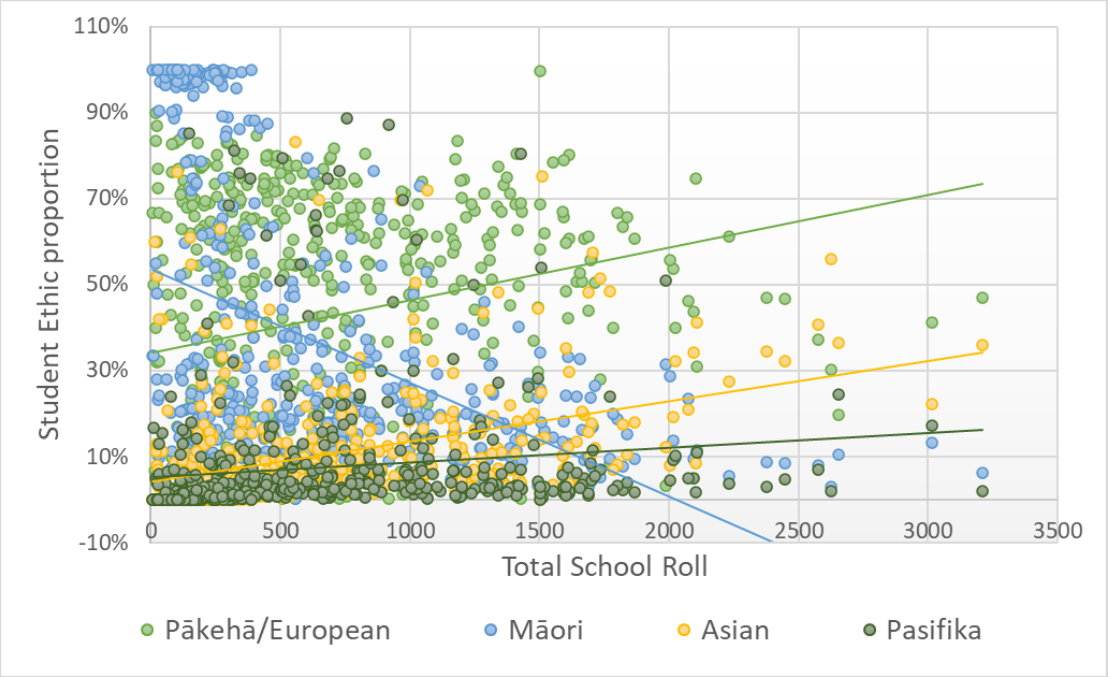
diverge markedly from the overall population ratios shown in Table D-4 as families seek out familiar cultural settings in schools for their children.

School ethnic proportions vary greatly across schools and are correlated to some degree with Total school rolls, particularly for Māori (negatively). These data with linear trend lines are presented graphically in Figure D-3.

For all ethnicities, some schools provide a more homogeneous own-culture experience (i.e. greater than 50% own-ethnicity) while others provide a more heterogeneous cultural environment where ethnic proportions more closely resemble the overall population proportions shown in Table D-4. The partial and sometimes extreme ethnic segregation within homogeneous environments provides some students with a relatively own-culture-inclusive experience and for others an own-culture-exclusive experience.

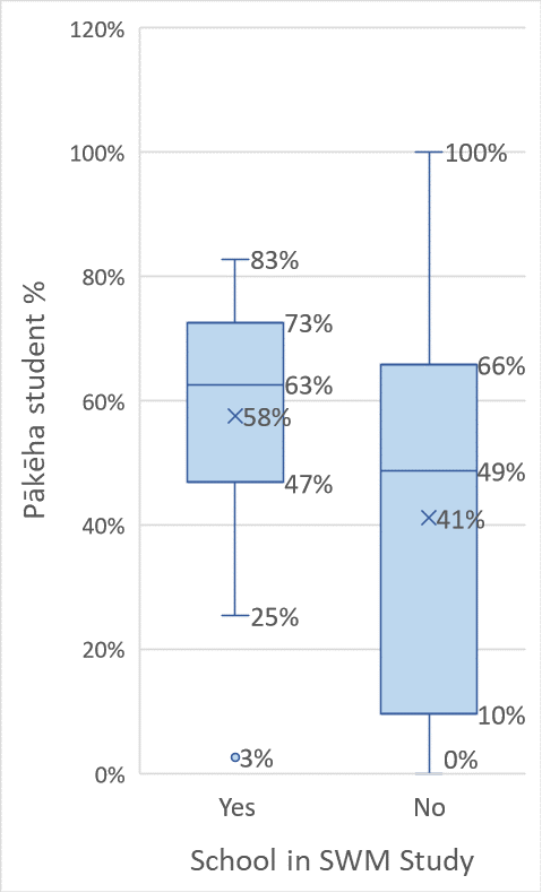
The proportion of Māori in small schools varies from zero to 100% but shows a declining linear trend with increasing school roll size at a rate of 26% per 1,000 students. The proportions of European/Pākehā and Asian students increase by 12% and 9% respectively, per 1,000 students on the roll. This school roll correlation with ethnicity is relatively strong for Māori 'explaining' 20% of the total variation across all schools and for Asian students (15%), but weak for European/Pākehā (6%) and negligible for Pacifika students. That is to say, the higher median school size of the Study group is also associated with the inclusion of fewer Māori and more European/Pākehā and Asian students.

*Figure D-3 The correlation of total school roll with the proportions of the four largest ethnic groups of students in New Zealand senior secondary student inclusive schools.*




Among the 22 Study schools the median proportion of students that identify as European/Pākehā is 63%, 14 percentage points higher than that for the All-Other schools as shown in Figure D-4. The probability of a difference between these medians this large occurring by chance for samples of this size from the given complete dataset (527 schools) was found to be very low, lying between 1.6% and

*Figure D-4 Comparison of the proportion of students that identify as European/Pākehā in the Study and Non-Study schools.*

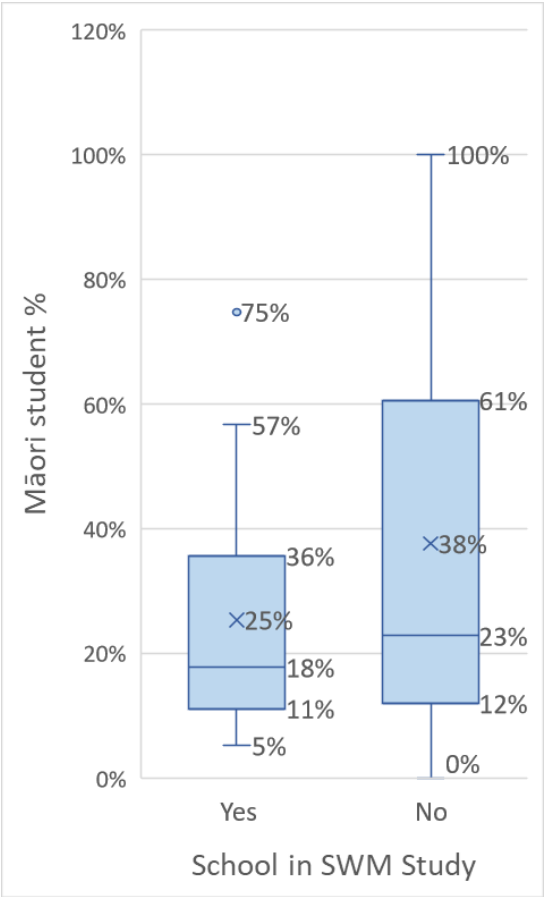



3.6% with 95% confidence[14], using the computational technique of rerandomization of the median also known as bootstrap resampling (Wild, Pfannkuch, et al., 2011)—available on the NZgrapher website (Wills, n.d.). This relatively high median proportion is partially explained by the positive correlation of European/Pākehā% with Total School Roll noted above and the higher median school total roll of the Study schools arising from the teacher-participant self-selection research design. Both distributions of schools are skewed downwards which means that in the bottom half of schools by European/Pākehā% the European/Pākehā proportions are further below the median than those in the top half are above. The school ethnicity proportions for Māori, Asian, and Pacifika students are also skewed but in the opposite direction.

[14] The rerandomization method does not require that the compared distributions be normal but does not produce the same result on every run. To produce the range of estimates quoted, as a 95% confidence interval, each comparison was rerun 30 times and the normal standard error of the mean formula was applied to those results.

The differences in median proportions between the Study and All-Other groups of schools for other ethnicities were individually too small to demonstrate any statistically significant differences. However, it is instructive to compare the Māori ethnic proportions distributions for the Study and All-Other schools shown in Figure D-5.

*Figure D-5 Comparison of the proportion of students that identify as Māori in the Study and Non-Study schools.*




In contrast to the corresponding distributions for European/Pākehā proportions in schools, both are skewed upward due to the very high proportions (most over 95% Māori) of the top half of schools when sorted by Māori%. While the difference between the medians is not significant (18% and 23% respectively), as a result of this upward skew the difference between the mean proportions (25% and 38%), is significant with better than 95% confidence. Given the overall Māori student proportion of 24%, this is only possible due to the very small total rolls of those schools with high Māori proportions and it underscores the unique position of Māori as tangata whenua in this country's educational ecosystem. Although high Māori proportion schools are underrepresented among the Study schools, three of the twenty-two Study schools have Māori proportions over 50% and so the study is not completely bereft of schools with a Māori student majority.

At the individual student level, the median ethnic proportions experienced by students, of their own-ethnicity, tend to be higher than the corresponding median school percentages and overall proportions shown in Table D-4, due to the skewed overall distribution of school total rolls but also because ethnicities are partially segregated to varying degrees across the 527 senior secondary student-inclusive schools. 'Segregation' in this context simply means the own-ethnicity proportion experienced by students differs from their ethnicity's overall proportion in the student population shown in Table D-4. A higher proportion I have termed inclusive segregation, a lower, exclusive, and a value close to the overall proportion I refer to as neutral segregation. European/Pākehā students, often experience inclusive segregation which usually means also being in the majority. For minority ethnicities, inclusive segregation and especially the majority experience, are less common but can be found in some smaller schools.

For European/Pākehā students, the median experienced proportion of European/Pākehā in the Study schools is 69% (cf. 48% overall) and 61% in the All-Other schools with 95% confidence limits of 63-75% and 60-62% respectively, i.e. inclusive segregation in both groups. These confidence limits do not overlap which indicates a statistically meaningful difference but also that the proportions experienced are fairly consistent across most schools in the group. For Māori students, however, the median experienced proportion of Māori in the Study schools is 23% (cf. 24% overall) and 33% in the All-Other schools with 95% confidence limits of 12-33% and 29-36% respectively. Although this difference is not

statistically significant at the 95% confidence level, it again reflects the underrepresentation of strongly Māori schools in the Study group, i.e. exclusive segregation. Asian students experience a lower median own-ethnicity proportion of 19% in the Study group (cf. 15% overall) and 25% in the All-Other group with 95% confidence limits of 15-24% and 23-27%. Pacifika students experience a median Pacifika proportion of 9% in the Study group (cf. 9% overall) but 25% in the All-Other group with 95% confidence limits of 0-26% and 21-28%. The contrast between the Study and All-Other groups at the individual student level is sharpest for European/Pākehā and Asian students with the former more often amongst their own-ethnicity in the Study group and the latter less often yet still inclusively segregated. Māori and Pacifika students by contrast typically experience neutral segregation in the Study group and relatively inclusive segregation in the larger All-Other group but also a greater range of ethnic environments in both groups of schools.

#### *D-1.1.4 School decile*

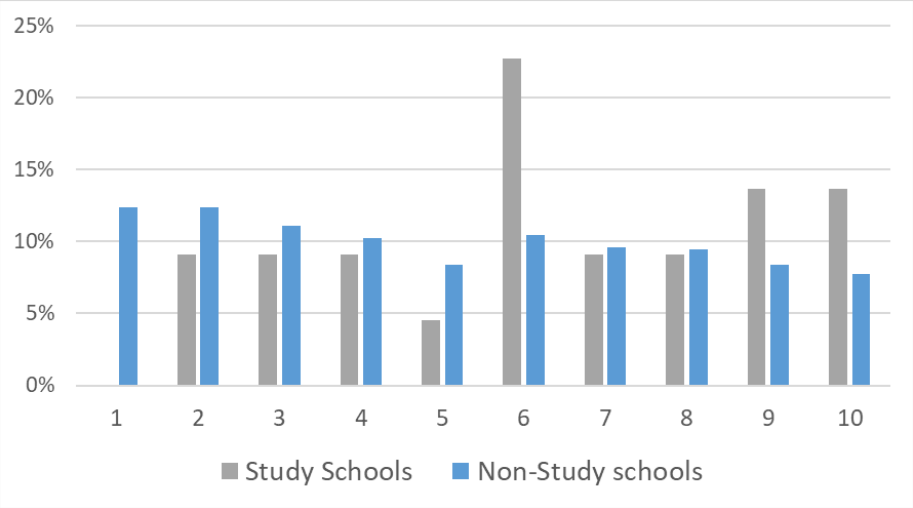
School decile rating was a metric used by the New Zealand government for 30 years up to the end of 2022, to allocate funding to state and state-integrated schools. The decile steps ranged from 1 for schools serving the lowest socio-economic communities to 10 at the highest point of the scale. In January 2023 the Ministry of Education replaced decile ratings with an 'Equity Index' based on "access to improved data and a better understanding of the socio-economic factors that have the most impact on student achievement" (NZ Ministry of Education, 2022a).

At the time the data for this study was collected in 2021-22, two of the Study schools—which also became Unit schools—and 27 of the All-Other schools had no official New Zealand Ministry of Education (MoE) decile rating assigned. To avoid understating the spread of decile values when comparing means for the relatively small Study and Unit group samples, I used estimated decile ratings for the two missing Study schools (2 and 10,) based on other information provided by the respective teachers. These values do not change the Study group mean.

The mean decile rating of the Study schools was 6.4 compared to 5.1 for the All-Other schools. The difference is greater than one decile rank and statistically significant with only a 1.5 to 3.6% probability of occurring by chance (by rerandomization with 95% confidence). The two distributions in percentage terms are displayed in Figure D-7. I have compared means in this case rather than medians since the decile scale has only 10 ordinal values and means provide for greater precision by allowing fractional values. Also, the ordinal scale already eliminates the possibility of extreme outliers from radically skewing the distributions resulting in misleading means.

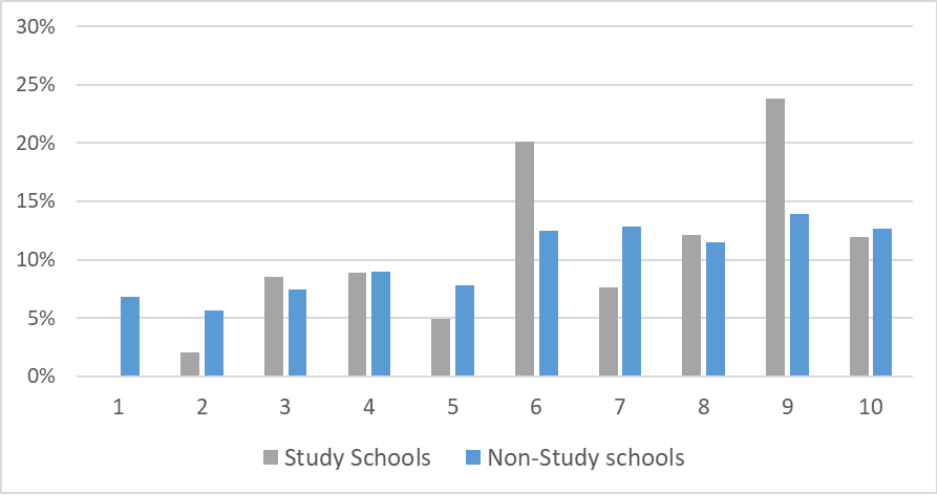
Neither distribution is normal. The Study group has three modal groups at decile bands 3-4, 6, and 9-10. Allowing for the statistical variation likely with just 22 Study schools, this distribution approximately reflects the underlying bimodality of the more representative All-Other group which has small peaks at decile bands 1-2, and 6. This socio-economic bimodality is associated with the governing authority and type of schools as we will see below.

*Figure D-7 Percent of schools vs Decile Rating comparison for the 20 Study schools with the 478 Non-Study schools that have ratings.*




Socioeconomic decile ratings are weakly correlated ($r^2$=0.2) with total school rolls increasing by 2.3 points per thousand students on the roll. This correlation effectively removes the median decile difference between the Study and All-Other schools as experienced by students, i.e. when the schools' decile ratings are weighted by their Total Rolls. There are schools of all deciles for roll numbers below 1,000, although more in the lower deciles, but above that number and particularly over 1,500, deciles of 6 and above predominate. The effect of this correlation on the school deciles that students experience can be seen in Figure D-6. The bias toward higher deciles is clear in both distributions. The modal peaks have shifted upward and are more exaggerated, particularly in the Study group where the mean decile is 7.0 compared to 6.2 in the All-Other group. The difference (0.8) is less than for the mean decile comparison of schools (1.3) and not statistically significant with a 20% probability of being due purely to chance. The median decile for students is 7 for both groups.

*Figure D-6 Percent of Students vs Decile Rating comparison for the 22 Study schools with the 478 Non-Study schools that have ratings.*



### *D-1.1.5 School Character*

Seventy percent of the senior secondary student-inclusive schools, in Aotearoa New Zealand and 76% of the students in these schools come under the State's authority, as distinct from State-Integrated, and Private school authorities. Among the 22 schools of teachers who participated in this study State schools are fairly represented both in frequency and their total number of students, while they are underrepresented among the final group of seven Study-Unit schools. In its directory of New Zealand schools, the New Zealand Ministry of Education (MoE) also classifies schools by type and school definition. A school's type depends on the age range of its students. Composite schools cater for all ages from kindergarten to year 13 senior students. Three other school types cater for various ranges of year levels from year 7 up to year 15. Composite schools comprise thirty-five percent of the secondary student-inclusive schools and educate seventeen percent of the students. They are underrepresented in the Study group (18%) but are overrepresented in terms of student numbers amongst the final group of seven Study-Unit schools(19%). 'School definition' includes categories such as "Designated Character School" and "Kura Kaupapa Maori" or Māori language immersion schools (kura). These are both minority categories comprising just six and nine percent respectively of the secondary student-inclusive schools and 2.1% and 2.4% of their students. Designated Character Schools are fairly represented among the study schools (5%) but substantially overrepresented amongst the final group of seven Study-Unit schools, particularly in student number (19%) while no teachers from Kura Kaupapa Maori schools offered to participate in this study.

To better understand the individual character of the Study and the Study-Unit schools and the situations of the teachers who contributed to this research, I created a composite binary categorisation scheme for the 527 secondary student-inclusive schools, based on the three MoE classifying fields described above, categorising the schools as either 'Mainstream Secondary' or 'Special Character'. 'Mainstream Secondary' I defined as School Authority = "State", School Type = "Secondary (Year 7-15, or 9-15, or 11-15)", and School definition = "Not Applicable". All other schools were categorised as 'Special Character'. A key distinction here is the age range of students in each school type. The minimum, age of students in 'Mainstream Secondary' schools is year 7 whereas the minimum age in 'Special Character' schools is at most year 7 and often as low as year 1 or preschool.

While the Mainstream Secondary/Special Character distinction usefully simplifies the statistical analysis it also masks the variabilty of school types within the Special Character aggregation. Table D-5 and Table D-6 are provided to give the reader some appreciation of this variability and how it is related to the numbers of schools and students in the Study and All-Other groups. The Study group included schools from all three of the main groups of school Authority; Private: Fully Registered, State: Integrated, and State. These tables also show how the eight Principal Component Analysis (PCA) schools of the teachers that reached phase three of the study differed from the 15 No-PCA schools that did not.

Table D-7 shows how School Character ('Mainstream Secondary' or 'Special Character') relates to the various categories within each of the three MoE directory descriptors. One of the study participants—Daniel, who provided the SWM project outline 'Urban farming outreach'—teaches in a trades academy that is not in the MoE directory. In March 2023, this academy became registered by New Zealand Qualification Authority (NZQA) as a Private Training Establishment or PTE. I have classified this trades academy as a 'Special Character' school and assigned it 'NA' for each of the MoE-Descriptors. As a specialist provider of sustainability and environmental education, its teachers sometimes work with students in Mainstream Secondary schools and this was the case with the 'Urban Farming Outreach' project.

*Table D-5 Categories and Subcategories of Special Character and Mainstream Secondary Schools showing the Number of schools per subcategory in the Study PCA, Study No-PCA, and All-Other Schools groups*

| Authority | Type | Definition | Study PCA | Study No PCA | All Other |
|---|---|---|---|---|---|
| **Special Character** | | | | | |
| | **NA** | | 1 | | |
| | **Private: Fully Registered** | | | | |
| | | Composite (K-13) | Not Applicable | 1 | | 29 |
| | | | School with Boarding Facilities | | 1 | 6 |
| | | | School for pupils with intellectual impairments | | | 1 |
| | | Secondary (Year 7-15) | Not Applicable | | | 5 |
| | | | School with Boarding Facilities | 1 | | 2 |
| | | Secondary (Year 9-15) | Not Applicable | | | 5 |
| | | | School with Boarding Facilities | | | 4 |
| | **Private: Fully Registered Total** | | | **2** | **1** | **52** |
| | **State: Integrated** | | | | | |
| | | Composite (K-13) | Not Applicable | | | 32 |
| | | | School with Boarding Facilities | | | 1 |
| | | Secondary (Year 7-15) | Not Applicable | 1 | 1 | 26 |
| | | | School with Boarding Facilities | | | 14 |
| | | | Secondary Maori Boarding School | | | 1 |
| | | Secondary (Year 9-15) | Not Applicable | | 1 | 14 |
| | | | School with Boarding Facilities | | | 9 |
| | | | Secondary Maori Boarding School | | | 3 |
| | **State: Integrated Total** | | | **1** | **2** | **100** |
| | **State** | | | | | |
| | | Composite (K-13) | Designated Character School | 1 | | 22 |
| | | | Kura Kaupapa Maori | | | 45 |
| | | | Not Applicable | | 1 | 41 |
| | | Secondary (Year 7-15) | Designated Character School | | | 3 |
| | | | School with Boarding Facilities | | | 4 |
| | | Secondary (Year 9-15) | Designated Character School | | | 8 |
| | | | Kura Kaupapa Maori | | | 1 |
| | | | School with Boarding Facilities | | | 33 |
| | **State Total** | | | **1** | **1** | **157** |
| | **Private: Provisionally Registered** | | | | | |
| | | Composite (K-13) | Not Applicable | | | 1 |
| | **Private : Provisionally Registered Total** | | | | | **1** |
| **Special Character Total** | | | | **5** | **4** | **310** |
| **Mainstream Secondary** | | | | | | |
| | **State** | | | | | |
| | | Secondary (Year 11-15) | | | | 3 |
| | | Secondary (Year 7-15) | Not Applicable | 1 | | 48 |
| | | Secondary (Year 9-15) | Not Applicable | 2 | 10 | 144 |
| | **State Total** | | | **3** | **10** | **195** |
| **Mainstream Secondary Total** | | | | **3** | **10** | **195** |
| **Grand Total** | | | | **8** | **14** | **505** |

*Table D-6 Categories and Subcategories of Special Character and Mainstream Secondary Schools showing the Number of Students per subcategory in the Study PCA, Study No-PCA, and All-Other Schools groups*

| Authority | Type | Definition | Study PCA | Study No PCA | All Others |
|---|---|---|---|---|---|
| **Special Character** | | | | | |
| **NA** | | | 162 | | |
| **Private: Fully Registered** | | | | | |
| | Composite (K-13) | Not Applicable | 93 | | 10,624 |
| | | School with Boarding Facilities | | 1,614 | 6,077 |
| | | School for pupils with intellectual impairments | | | 33 |
| | Secondary (Year 7-15) | Not Applicable | | | 900 |
| | | School with Boarding Facilities | 690 | | 3,426 |
| | Secondary (Year 9-15) | Not Applicable | | | 323 |
| | | School with Boarding Facilities | | | 2,695 |
| **Private: Fully Registered Total** | | | **783** | **1,614** | **24,078** |
| **State: Integrated** | | | | | |
| | Composite (K-13) | Not Applicable | | | 14,235 |
| | | School with Boarding Facilities | | | 591 |
| | Secondary (Year 7-15) | Not Applicable | 442 | 1,044 | 18,794 |
| | | School with Boarding Facilities | | | 6,694 |
| | | Secondary Maori Boarding School | | | 146 |
| | Secondary (Year 9-15) | Not Applicable | | 399 | 6,637 |
| | | School with Boarding Facilities | | | 4,207 |
| | | Secondary Maori Boarding School | | | 235 |
| **State: Integrated Total** | | | **442** | **1,443** | **51,539** |
| **State** | | | | | |
| | Composite (K-13) | Designated Character School | 641 | | 2,822 |
| | | Kura Kaupapa Maori | | | 7,309 |
| | | Not Applicable | | 981 | 10,325 |
| | Secondary (Year 7-15) | Designated Character School | | | 795 |
| | | School with Boarding Facilities | | | 3,703 |
| | Secondary (Year 9-15) | Designated Character School | | | 2,643 |
| | | Kura Kaupapa Maori | | | 36 |
| | | School with Boarding Facilities | | | 34,599 |
| **State Total** | | | **641** | **981** | **62,232** |
| **Private: Provisionally Registered** | | | | | |
| | Composite (K-13) | Not Applicable | | | 31 |
| **Private: Provisionally Registered Total** | | | | | **31** |
| **Special Character Total** | | | **2,028** | **4,038** | **137,880** |
| **Mainstream Secondary** | | | | | |
| **State** | | | | | |
| | Secondary (Year 11-15) | | | | 2,475 |
| | Secondary (Year 7-15) | Not Applicable | 771 | | 27,056 |
| | Secondary (Year 9-15) | Not Applicable | 3,044 | 10,120 | 140,230 |
| **State Total** | | | **3,815** | 10,120 | 169,761 |
| **Mainstream Secondary Total** | | | **3,815** | 10,120 | 169,761 |
| **Grand Total** | | | **5,843** | **14,158** | **307,641** |

[In Table D-6 the PCA student total is 1.78% of the Grand Total, and the Study students total is 6.10%]

Despite being in the minority of senior secondary student-inclusive schools overall, Mainstream schools predominate in the Study schools group with a proportion 20% above that in the overall population of schools. This association is statistically significant (93% confidence). The frequencies are shown in Table D-8 and the group proportions in Table D-9. When the table cells are weighted by student numbers, i.e. School Character as experienced by most students, the same conclusion is reached. This association is slightly weaker (with a proportion 15% above the overall population) since overall the majority of students (56%) are enrolled in Mainstream schools which affects numbers in both the Study and All-Other groups, as shown in Table D-10. The mean Total Roll in Mainstream schools is 883 compared to just 453 in Special Character schools.

*Table D-7 School Character vs MoE school directory descriptor categories.*
*(Only MoE categories applying to the Study schools are included in this table. Mainstream secondary schools must be in one category from all three descriptors for that School Character. Special Character schools need only be in any of the three descriptor categories for that definition)*

| | | **School Character** | |
|---|---|---|---|
| | | **Mainstream Secondary** | **Special Character** |
| **MoE Descriptors** | **School Authority** | State | State: Integrated<br>Private: Fully Registered<br>NA |
| | **School Type** | Secondary (Year 7-15)<br>Secondary (Year 9-15)<br>Secondary (Year 11-15) | Composite (K-13)<br>NA |
| | **School definition** | Not Applicable | Designated Character School<br>School with Boarding Facilities<br>NA (1) |

*Table D-8 Comparison of the numbers of Study and All-Other schools by School Character*

| | **Study schools** | **All-Other schools** | **Total** |
|---|---|---|---|
| **Special Character** | 9 | 310 | 319 |
| **Mainstream Secondary** | 13 | 195 | 208 |
| **Total** | **22** | **505** | **527** |

*Table D-9 Comparison of the proportions of Study and All-Other schools by School Character*

| | Study schools | All-Other schools | Total |
|---|---|---|---|
| **Special Character** | 41% | 61% | 61% |
| **Mainstream Secondary** | 59% | 39% | 39% |
| **Total** | 100% | 100% | 100% |

*Table D-10 Comparison of the proportions of students in the Study and All-Other schools by School Character*

| | Study schools | All-Other schools | Total |
|---|---|---|---|
| **Special Character** | 30% | 45% | 44% |
| **Mainstream Secondary** | 70% | 55% | 56% |
| **Total** | 100% | 100% | 100% |

The categorisation of schools as Mainstream Secondary or Special Character, and the further differentiation of the latter category by School Authority, School Type, and School definition, offers some useful insights into the socioeconomic decile metric and student ethnic proportions correlates of the education administrative categories.

Earlier we saw that the mean decile rating for the Study schools was higher by 1.3 points than that for the All-Other majority of schools and that the frequency distributions for both were bimodal (as shown in Figure D-7). The mean decile difference of 1.3 is entirely attributable to the Special Character schools. There is no significant difference in the Mainstream Secondary schools' mean decile ratings between the Study and All-Other groups (overall average 5.2) but there is a difference of 2.3 in the Special Character schools' mean ratings between the study groups which is statistically significant with 93% confidence. The relevant figures are highlighted in yellow in Table D-11.

For the All-Other majority of schools, the Mainstream Secondary and Special Character schools share the same mean decile of 5.1. By contrast, for the 22 Study schools, the mean decile of the Special Character schools (7.4) is substantially higher than that of the Mainstream Secondary schools (5.6) although this difference is not statistically significant due to the small sample sizes and the spread of values in both classifications. However, drilling down further we see that the 'Special Character' category is comprised of four subcategories: 'Private: Fully Registered', 'State: Integrated', 'State: Composite', and 'State Secondary: (special definitions)', all with statistically distinct decile means. These means have been highlighted in green for the All-Other group and the Overall column in Table D-11.

In all subcategories of Special Character, where there are Study schools, their mean decile is substantially higher than the overall mean for that subcategory (apart from NA where there was only one school and the decile is estimated). This is particularly marked for the State Composite schools (overall mean 2.9) where half of the schools are Kura Kaupapa Māori and the average proportion of Māori students is 78%. That figure should be compared to the two State Composite schools with teachers that participated in this study (mean decile 6.0) where the proportions of Māori students were just 15% and 23%. Teachers' willingness to join this Study toward an SWM is positively correlated with the socioeconomic status of their school as already noted, but this is particularly true for the Special Character schools.

*Table D-11 School mean decile ratings by School character, Authority and Type for the Study and All-Other groups.*

| School Character | School Authority | School Type | Study schools | All-Other schools | Overall Mean | No. Schools |
|---|---|---|---|---|---|---|
| Special Character | NA | | 2.0 | | 2.0 | 1 |
| | Private: Fully Registered | | 10.0 | 8.8 | 8.9 | 29 |
| | State: Integrated | | 7.7 | 6.5 | 6.5 | 103 |
| | | Composite | 6.0 | 2.8 | 2.9 | 110 |
| | State (special definitions) | Secondary (Year 7-15) | | 5.1 | 5.1 | 7 |
| | | Secondary (Year 9-15) | | 5.5 | 5.5 | 42 |
| | **State Mean** | | 6.0 | 3.6 | 3.6 | 159 |
| **Special Character Total** | | | 7.4 | 5.1 | 5.2 | 292 |
| **Mainstream Secondary** | | | 5.6 | 5.1 | 5.2 | 208 |
| **Overall Mean** | | | 6.4 | 5.1 | 5.2 | 500 |

The underrepresentation of schools with a high proportion of Māori students in the Study group has already been noted. The median was just 18%. Again though the Special Character schools of the Study group are mainly responsible for this bias. Overall the mean proportions for the Study schools relative to the All-Other schools are 25% and 38% respectively (see Figure D-5) but for the Special Character schools, they are 21% and 42%. Both differences are statistically significant (95% confidence).

The dominant culture in schools—as reflected in their ethnic proportions—is interwoven with socioeconomic status. Schools' decile ratings are moderately correlated with their proportions of European/Pākehā and Māori students with $r^2$ values of 57% and 53% respectively. That is, just over half the variance in one factor is 'explained' by the variance of the other. In light of this correlation, the higher average decile ratings of the Special Character Study group schools are consistent with their

lower Māori student proportions (and higher European/Pākehā proportions). At the same time clearly, decile ratings alone cannot explain the underrepresentation of high-proportion Māori schools in the Study-Schools.

### *D-1.1.6 Urban-Rural*

Given the extent to which New Zealander's environmental impact is dominated by current land-use practices, pastoral farming in particular, and political sensitivities to this reality, the location of schools on the urban-rural spectrum could be expected to influence their readiness to adopt a sustainability and wellbeing centred curriculum.

The Ministry of Education places schools in one of four Urban Area categories: Main Urban Area, Secondary Urban Area, Minor Urban Area, or Rural Area. To enable stronger statistical inferences about the relatively small number of Study schools, I reduced these four categories by aggregation, to just two: Urban (Main Urban Area, and Secondary Urban Area), and Rural (Minor Urban Area, and Rural Area). According to statistics derived from the New Zealand Department of Statistics website[15] Urban schools are typically located in towns or cities with estimated populations, as of June 2022, anywhere between 58,000 (Tuakau) to 1.44M (Auckland). Rural schools are located in towns or regions of between 1,800 (Edgecumbe) and 15,800 (Queenstown). An important limitation of this categorisation scheme to note is that the local economies of many provincial towns in New Zealand are majorly dependent on their surrounding farming communities and fishing or forest industries, and yet are still designated as 'Main Urban Area' (e.g. Cambridge, Gisborne) or 'Secondary Urban Area' (e.g. Whakatane).

The proportion of Study Schools located in Urban areas of the country is greater than would be expected from the relative numbers of Urban and Rural secondary-student-inclusive schools across the country. Nineteen (86%) of the 22 Study schools are Urban compared to 68% of these schools overall, while only 3 (14%) were classed as Rural compared to 32% overall. The actual numbers for each group are shown in Table D-12. in and the proportions are in Table D-13. The probability of this bias occurring purely by chance is only 6.4% based on the Fisher Exact test (2-tailed) for contingency tables but is likely another consequence of the participant recruitment strategy with its bias toward larger schools.

*Table D-12 The numbers of Urban and Rural schools in the Study, All-Other and overall groups of secondary student-inclusive schools.*

| | **Study Schools** | **All-Other Schools** | **Total** |
|---|---|---|---|
| Urban | 19 | 339 | 358 |
| Rural | 3 | 166 | 169 |
| **Total** | 22 | 505 | 527 |

[15] https://nzdotstat.stats.govt.nz/wbos/Index.aspx?DataSetCode=TABLECODE7980

*Table D-13 The proportions of Urban and Rural schools in the Study and All-Other groups of secondary student-inclusive schools*

| | Study Schools | All-Other Schools | Total |
|---|---|---|---|
| Urban | 86% | 67% | 68% |
| Rural | 14% | 33% | 32% |
| **Total** | 100% | 100% | 100% |

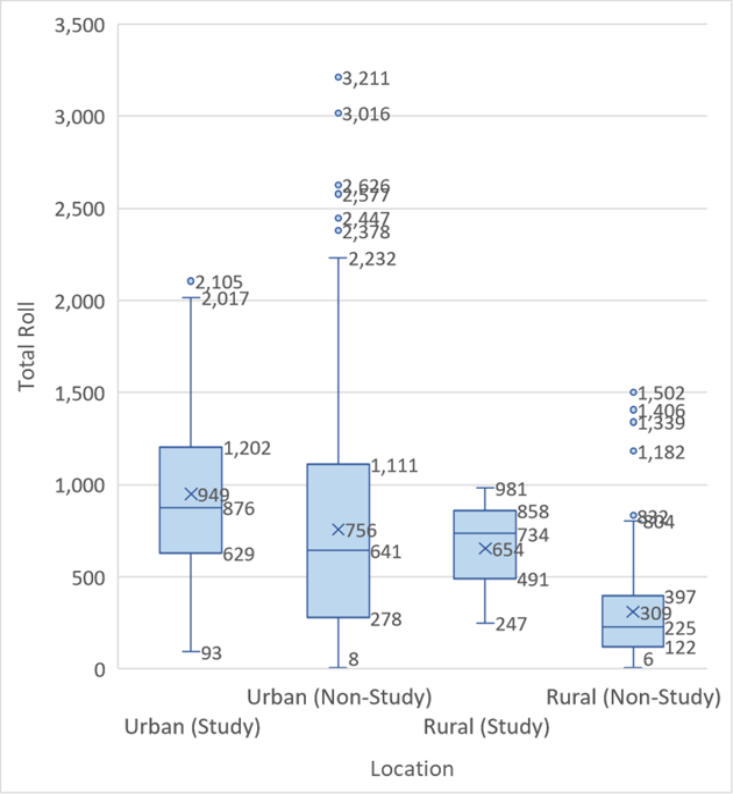
Of the five demographic variables considered in this section, Urban-rural location is the most strongly associated with total school roll. Over the 527 senior secondary student-inclusive schools the median Total Roll for Urban schools is 647 cf. 228 for Rural schools (i.e. 2.8 times larger). Figure D-8 compares the median Total Rolls of the Urban and Rural schools within the Study group (876 and 641) and All-Other groups (734 and 225). All three of the Rural Study schools have total rolls far above the Rural All-Other school's median. The difference (509) between the median Total rolls of these three schools and the median for All-Other Rural schools has a probability of only 1.0 to 2.5% (by rerandomization) of being due purely to chance. The corresponding comparison for the Urban schools is less dramatic although still with only an 8 to 11% probability of being due purely to chance. As the probability that schools joined the study was directly related to their number of teachers it would seem therefore that the underrepresentation of participating teachers from Rural schools in this study cannot be separated from the research design effect on school size.

At the individual student level, the Urban bias in the Study group is accentuated by the larger Total Rolls of the Urban schools. Table D-14 shows the proportions of urban and rural school students (rather than whole schools) for the Study and All-Other groups.

*Table D-14 The proportions of Urban and Rural School Students in the Study and All-Other groups of secondary student-inclusive schools*

| | Study Schools | All-Other Schools | Total |
|---|---|---|---|
| Urban | 90% | 83% | 84% |
| Rural | 10% | 17% | 16% |
| **Total** | 100% | 100% | 100% |

*Figure D-8 Total roll numbers comparison for Urban and Rural schools in the Study and Non-Study groups.*




The Urban proportions of students are greater than those of schools shown in Table D-13 but the contrast between the Study and All-Other schools is less dramatic for both Urban and Rural students. This finding is a result of the number of some very large outlier schools in the All-Other Group, in both Urban and Rural locations, while the Study Schools group has only two schools with over 2,000 students. The underrepresentation of Rural students in the Study group is real but as seen already, could quite likely be due to a minimum Total roll size effect rather than to their rural location per se. A further complication for the Urban-Rural comparison is that the children of farming communities are not uncommonly enrolled at urban schools with boarding facilities including those with a high

commitment to Sustainability and Wellbeing education. In describing the 'Te Ara Year 12' project at her Main Urban Centre school, Rebecca commented;

> Quite a large proportion of our [students] are from rural communities. So we talked about the [value of] irrigation reliability ... over ecological health. And the mana of water.

#### *D-1.1.7 University Entrance and NCEA Level 2 Attainment*

Being able to maintain academic achievement particularly University Entrance attainment while introducing the proposed SWM, was mentioned as a concern by seven of the participants at various points of the study, either for them or for their colleagues. Data on the 2022 National Certificate of Educational Achievement (NCEA) Level 2 and University Entrance results obtained from NZQA shows that there are no significant differences in attainment rates between the Study and All-Other schools for either of these qualifications. Figure D-9 compares NCEA Level 2 cumulative attainment rates for year 12 students and Figure D-10 University Entrance cumulative attainment rates for year 13 students between the Study and All-Other schools. NCEA level 2 is typically achieved by students in year 12 and University Entrance in year 13, but students can qualify earlier for either and 'cumulative' refers to the total number of students who qualify by the end of the given year level.

Qualification attainment rates have no discernible correlation with Total School rolls which means the school attainment rates experienced by students are distributed in a way very similar to those of the schools themselves with similar medians.

*Figure D-9 NCEA Level 2 Cumulative attainment rate comparison in 2022 for year 12 students for the Study and Non-Study schools*

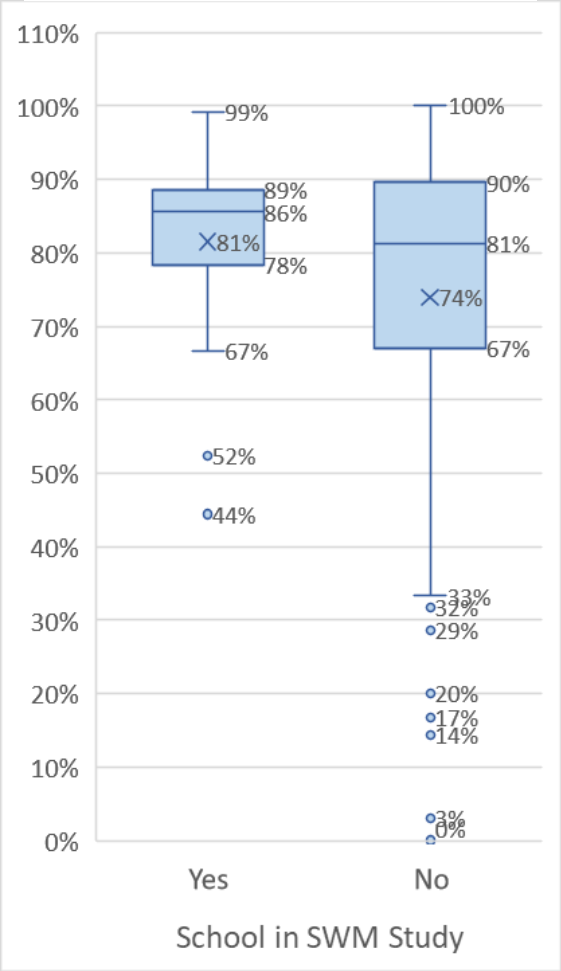
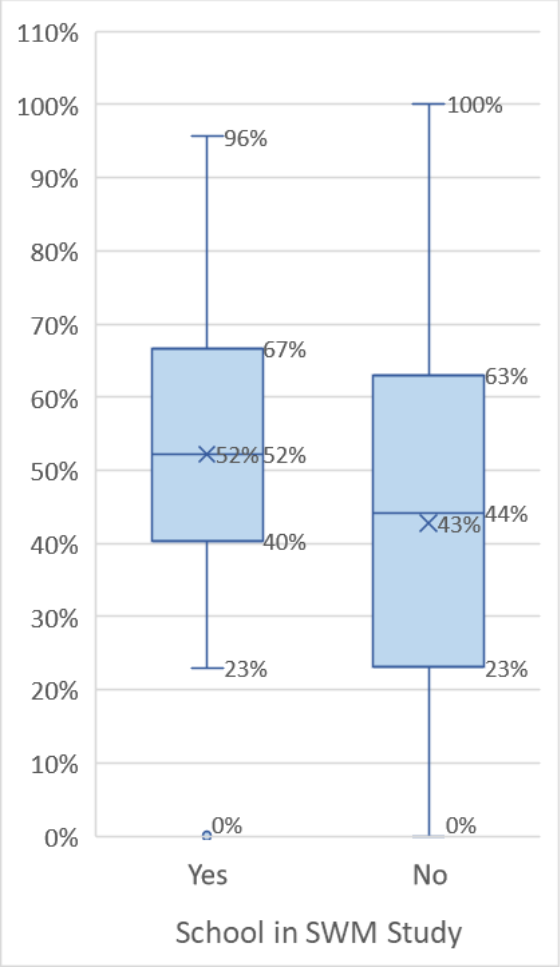



*Figure D-10 University Entrance Cumulative attainment rate comparison in 2022 for year 13 students for the Study and Non-Study schools*




### *D-1.1.8 Summary*

To summarise Section D-1.1, the 22 Study schools can be characterised relative to the 505 other All-Other New Zealand senior-secondary-student-inclusive schools as;

- being a representative sample in terms of total school rolls. They have a substantially higher median total roll (842 cf. 421), which is consistent with the recruitment and self-selection of teacher participants for this study whereby larger schools were more likely to be included;
- having a similarly upwardly skewed distribution toward a few very large schools which means the median student experience of Total Rolls (1,027 and 1,039 respectively) is significantly above the corresponding school-level median total roll (824 and 421) in both groups;
- Having a higher proportion of girls-only schools (27%) compared to the overall proportion of 11% across the country and a lower proportion of Co-Ed schools (64% cf. 80% overall). The estimated female-to-male student ratio is 58:42 for the Study schools cf.50:50 for the All-Other schools;

- Having a higher median proportion of European/Pākehā students (63% cf. 49%). When school proportions are weighted by their Total Rolls, European/Pākehā students, experience a significantly higher median own-ethnicity proportion (69% cf. 61%) i.e. more inclusive segregation and a median own-ethnicity majority in both groups;
- Having a lower median proportion of Māori students (18% cf. 23%) which difference is not significant but also a lower mean (25% and 38%) which difference is significant. The higher means than medians demonstrate the upward skew in both distributions showing the relatively much higher proportions in the top half of schools and the relative underrepresentation of high Māori proportion schools in the Study group. When school proportions are weighted by their Total Rolls, Individual Māori students are seen to experience median own-ethnicity proportions of 23% and 33% (cf. 24% overall students in all schools) indicating almost neutral segregation in the Study group and inclusive segregation in the All-Other schools. The difference is not statistically significant however due to the wide range of own-ethnicity proportions across schools in both groups.
- Having very similar median proportions of Asian students (6% and 5%). As for Māori, both distributions show strong upward skew. When school proportions are weighted by their Total Rolls, individual Asian students are seen to experience median own-ethnicity proportions which are more differentiated and lower in the Study than in All-Other schools, 19% and 25% although still showing inclusive segregation in both groups.
- Having equal median proportions of Pacifika students (3%). As for Māori and Asian students, both distributions show strong upward skew. When school proportions are weighted by their Total Rolls, individual Pacifika students are seen to experience median own-ethnicity proportions of 9% and 25% (cf. 9% overall students in all schools) indicating neutral segregation in the Study group and inclusive segregation in the All-Other schools but as for Māori, the difference is not statistically significant due to the wide range of proportions in both groups.
- Having a significantly higher mean socioeconomic decile rating of 6.4 compared to the All-Other schools' mean of 5.1. When schools' decile ratings are weighted by their Total Rolls we see the typical school decile experienced by students is higher in both groups (7.0 and 6.2 respectively)—due to a weak positive correlation of decile with Total Roll—but this difference is not statistically significant.
- a majority of year 7 through year 15 'Mainstream Secondary' schools (59%) over K-13 'Special Character' schools. The difference is counter to the minority proportion (39%) of 'Mainstream Secondary' schools in the overall population and statistically significant with 92.5% confidence. When schools' Total Rolls are considered more Study school students are likely to be attending 'Mainstream Secondary' than 'Special Character' schools (70:30, cf. 55:45 for All-Other schools) which is consistent with but more extreme than the corresponding overall ratio of 56:44. The Special Character schools are however mainly responsible for the higher mean decile rating of the Study schools as a whole, and their lower median proportion of Māori students;
- a lower-than-expected proportion of rural locations. Only 3 of the Study schools (14%) were classed as Rural compared to 33% in the All-Other schools and the difference is statistically significant (93.5% confidence). The three Rural Study schools have a substantially higher median Total Roll than the Rural All-Other schools. This suggests that their underrepresentation in the Study is related more to the much smaller total rolls of rural schools—and hence their lower probability of being included in this study by teacher recruitment—as much as to any hesitancy of rural school teachers per se., to be involved in

this Sustainability and Wellbeing education research. At the individual student level, the association of the Study group with Urban location is somewhat stronger also as a consequence of the higher Total Rolls of Urban schools.

- Statistically similar median rates of cumulative attainment in NCEA Level 2 for year 12 students (86% cf. 81%) and University Entrance results for year 13 students (52% cf. 44%) in 2022.

The schools of the teachers who agreed to participate in this study at its outset are representative of the overall population of senior secondary student-inclusive New Zealand schools in terms of their Total School Rolls as experienced by students and teachers. This is a consequence of the participant recruitment process for the study which probabilistically favours larger schools. These twenty-two schools are quite distinct, however, by every other demographic measure explored in this analysis. As a group, they are biased toward higher than typical: Total School Rolls; proportions of female and European-Pākehā students; and 'Mainstream Secondary', Urban, and higher decile schools. As we shall see in the following section, the schools of the seven teachers who persevered through the rounds of this study to provide complete SWM unit outlines are a distinct subset of the twenty-two Study schools in some ways more and other ways less like the general population of New Zealand senior secondary student-inclusive schools.

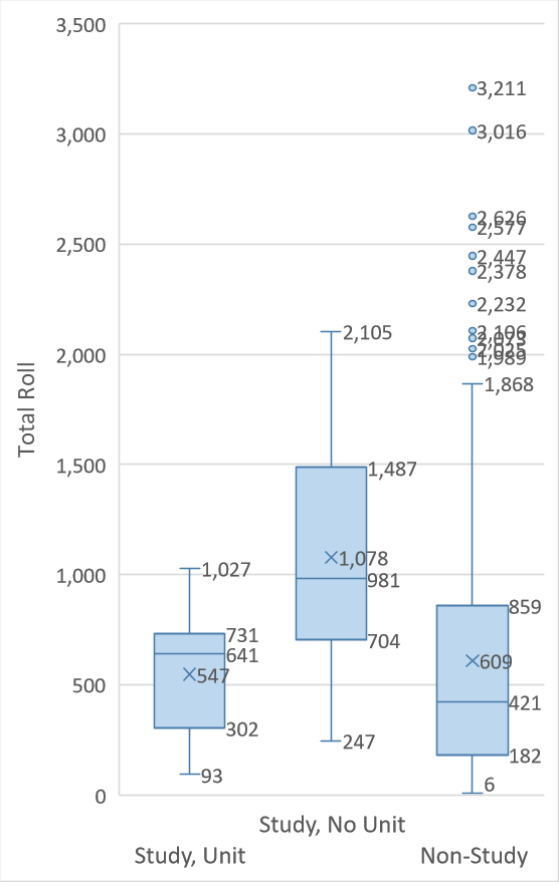
## *D-1.2 Comparing the Unit with the No-Unit schools*

### *D-1.2.1 Total School Roll*

From the total roll analysis in Section D-1.1.1, we know that the Study schools as a whole have a higher median total roll than the All-Other schools as an expected outcome of the teacher-participants recruitment and self-selection process for this study. The comparison of Total school rolls for the Study-Unit, Study-No Unit, and All-Other schools is shown graphically in Figure D-11. The median total roll for the seven Unit schools (641) is substantially less than that for the No-Unit schools (981), and this difference is statistically significant having a probability of between 3.8 and 7.0% of being due purely to chance (by rerandomization, 95% confidence). Effectively the range of total roll size for the Unit schools is from about 100 up to around 1,000 students compared to 200 to 2,000 for the No-Unit schools. This finding reinforces the suggestion made in Section D-1.1.1 that there may be factors related to school size that increasingly constrain teachers from undertaking curriculum transformation centred on sustainability and wellbeing as the roll approaches go beyond 1,000 students.

The Unit schools, by total roll size, are more typical of New Zealand high schools in general than the No-Unit schools. Although the Unit school median is 50% higher than that for the All-Other schools (421), the difference Is not statistically significant (being 20 to 24% probable by chance).

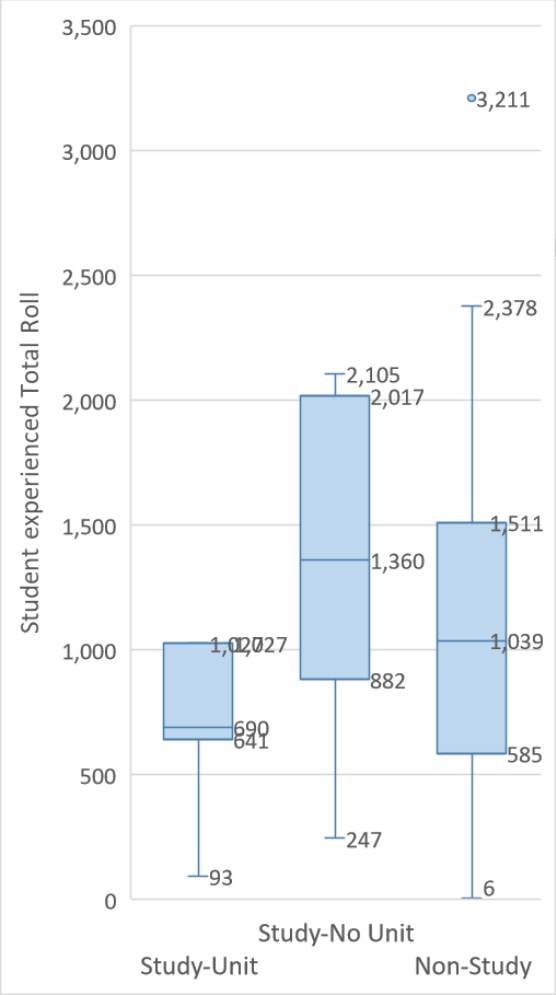
*Figure D-11 School level Total roll comparison for the 7 Study-Unit; 15 Study-No Unit and 505 Non-Study senior-secondary-student-inclusive schools.*




As already observed in Figure D-1, the distribution of schools by Total roll is markedly skewed upward by a few very large schools. Figure D-11 shows that this upward skew is reflected in the All-Other and Study-No Unit groups while the seven Study-Unit schools have a predominance of smaller schools which produces a clear downward skew. As noted in Section D-1.1.1 a lack of upward skew or the presence of downward skew in a total roll distribution of schools suggests the underrepresentation of large schools and further supports the hypothesis of an upper limit on total rolls in successful sustainability and wellbeing schools. Here again, though, the sample sizes and the differences in skew are too small to demonstrate statistical significance.

As already noted, an upwardly skewed distribution also means that the median student experience of school rolls is substantially higher than the median Total roll at the whole school level. The opposite effect holds for the Study-Unit group with its lower mean and downward skew. For the Study group as a whole the median student experienced roll is 1,027. But, as shown in Figure D-12 Student level Total Roll experienced comparison for the 7 Study-Unit; 15 Study-No Unit and 505 Non-Study senior-secondary-student-inclusive, the Unit and No-Unit groups have distinct medians of 690, and 1360, respectively and this substantial difference is statistically significant at the 95% confidence level despite the small sample sizes. The

*Figure D-12 Student level Total Roll experienced comparison for the 7 Study-Unit; 15 Study-No Unit and 505 Non-Study senior-secondary-student-inclusive*




Total Roll experienced by the median student in this group (690) is then very similar to the median school Total Roll for the Study-Unit group (641), in direct contrast to both the No-Unit and All-Other school groups. These findings are again strongly suggestive of upper-limit total roll-related factors constraining schools from transitioning to cross-curricular holistic curriculum designs supporting education for sustainability and wellbeing.

### *!.2.2 Gender of Students*

Despite there being no boys-only schools and double the expected number of girls-only schools in the Unit group, the sample size of 7 is too low to demonstrate a statistically significant association of School Student Gender with the Unit and No-Unit groups of schools. The actual frequencies for each group are shown in Table D-15.

However, the bias toward female students observed earlier in the Study schools as a whole (Table D-3), is even more pronounced between the Study-Unit and the Study No-Unit schools and this is statistically significant. Table D-16 shows the proportions of students in each category from which we can infer that the overall gender ratio in the Unit schools is 73:27 female to male while it is 55:45 in the No-Unit schools, again assuming an approximately 50:50 division in the Co-Ed schools. This contrast is both statistically significant and substantively important. Cramer's-V statistic, which provides a measure of the strength of the association between categorical variables, is 49%, suggesting that the association between the Study school groups based on Unit outline completion and school student gender is "moderate to high" (Crewson, 2016).

Apart from the absence of boys-only schools in the Unit group, substantial differences in average school Total rolls lie behind this bias. The five Co-Ed schools in the Study-Unit group are much smaller (mean 422 students) than those in the Non-Unit group (mean 1,187 students) —and smaller than the overall average (mean 570 students) for the total 421 Co-Ed schools—while the girls-only schools are about the same size in both unit groups. The relevant average Total school rolls are shown in Table D-17.

*Table D-15 The numbers of Co-Ed, Boys-only, and Girls-only schools in the Study-Unit and Study-No Unit groups of secondary student-inclusive schools*

| | Study-Unit Schools | Study No-Unit Schools | Total |
|---|---|---|---|
| Co-Ed | 5 | 9 | 14 |
| Boys | 0 | 2 | 2 |
| Girls | 2 | 4 | 6 |
| **Total** | 7 | 15 | 22 |

*Table D-16 The proportions by Total roll numbers of students in Co-Ed, Boys-only, and Girls-only schools in the Study and All-Other groups of secondary student-inclusive schools*

| | Study-Unit Schools | Study No-Unit Schools | All-Other |
|---|---|---|---|
| Co-Ed | 55% | 66% | 64% |
| Boys | 0% | 12% | 10% |
| Girls | 45% | 22% | 26% |
| **Total** | 100% | 100% | 100% |

*Table D-17 Average Total roll numbers of Co-Ed, Boys-only, and Girls-only schools in the Study and All-Other groups of secondary student-inclusive schools*

| | Study-Unit Schools | Study No-Unit Schools | All-Other |
|---|---|---|---|
| Co-Ed | 422 | 1187 | 914 |
| Boys | | 960 | 960 |
| Girls | 859 | 892 | 881 |
| **Total** | 547 | 1078 | 909 |

### *D-1.2.3 Student Ethnicity proportions*

The contrast between the Unit and No-Unit schools in their total populations of European/Pākehā and Māori students follows a similar pattern to their Total rolls. The Unit group is more like the general population of All-Other schools than the No Unit group. The European/Pākehā student population is substantially overrepresented in the No-Unit group but slightly underrepresented in the Unit group. The Māori student population is underrepresented in the No-Unit group but fairly represented in the Unit group. The Asian student population is underrepresented in both groups while the Pacifika

population is substantially underrepresented in the No-Unit group but substantially overrepresented in the Unit group. These findings are summarised in Table D-18 which is an extended version of Table D-4.

*Table D-18 Overall student population Ethnic proportions across the 527 senior secondary student-inclusive schools and within the Study and All-Other groups of schools*

| | Study Schools | | | All-Other Schools | Overall |
|---|---|---|---|---|---|
| | Unit | No-Unit | Total | | |
| European/Pākehā | 44% | 63% | 60% | 47% | 48% |
| Māori | 24% | 19% | 20% | 24% | 24% |
| Asian | 9% | 10% | 10% | 15% | 15% |
| Pacifika | 19% | 4% | 7% | 9% | 9% |
| Other Ethnicities | 3% | 3% | 3% | 5% | 5% |
| **Total** | 100% | 100% | 100% | 100% | 100% |

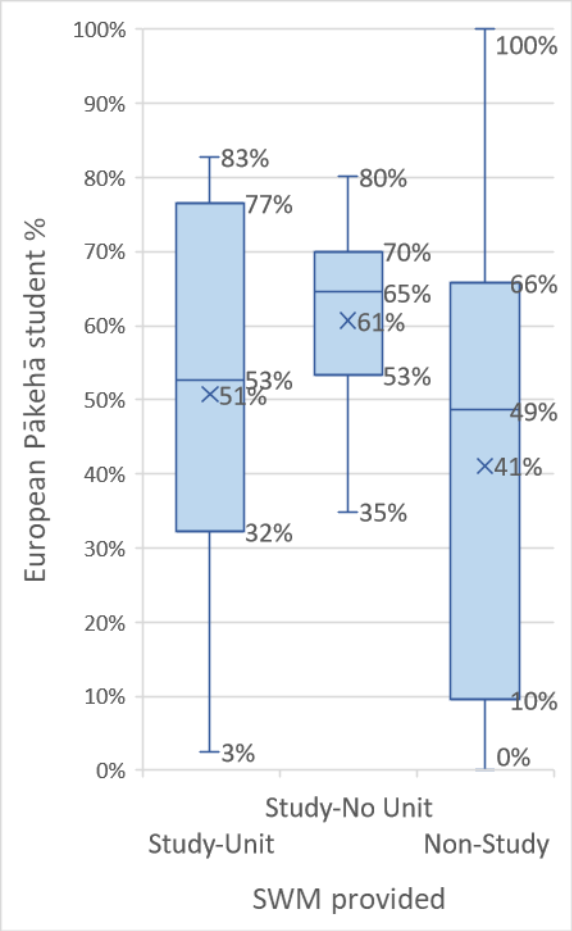
As shown in Figure D-13, the school European/Pākehā student proportion medians are similar for the Unit and All-Other group schools (53% and 49% respectively) and are substantially lower than the No-Unit schools group median (65%). Their distributions also include a much broader range of proportions. The No-Unit to All-Other group 16-point difference has a rerandomization probability of just 1.8 to 4.7%. The 12-point difference between the Unit and No-Unit medians is less statistically clear-cut with a rerandomization probability of 20 to 23%. All three distributions are skewed downwards consistent with the Study and All-Other distributions shown in Figure D-4.

The corresponding distributions for Māori proportions are displayed in. Again the Study-Unit schools more closely resemble the general population of All-Other schools than the No-Unit group. This is due in large part to Daniel's school, the source of the 'Urban Farming Outreach' project which is the outlier school in the Unit group for this statistic (75% Māori students). The median school proportions of Māori students are not statistically distinct among the Unit, No-Unit and All-Other schools. However, the mean proportions for the No-Unit and All-Other schools are. As for the Study versus All-Other schools comparison in Section D-1.1 (Figure D-5), the large number of small 100% Māori student schools dramatically skews the All-Other distribution upward and is responsible for this difference of 14 percentage points. Combining the results shown in Figure D-13 and Figure D-14 shows that the No-Unit schools had significantly higher European/Pākehā proportions and significantly fewer schools with high proportions of Māori students than the overall population of senior secondary student-inclusive schools.

Both the Asian and Pacifika school student proportion distributions for the No-Unit and All-Other groups show an extreme upward skew even greater than that of the Māori student distribution and for the same reason, i.e. the spread of proportions in the top half of schools is much greater than in the bottom half. The median school proportion of Asian students for the Unit group (8.6%, between 7.5 and 9.7 with 95% confidence), is significantly above that for both the No-Unit group (4.5%, between 2.2 and 6.9 with 95% confidence) and the All-Other group (5.1%, between 4.4 and 5.9 with 95% confidence). This is a consequence of the overall underrepresentation of Asian students in the Unit group (9% cf. 15% overall) and the downward skew in the Unit schools' distribution of Asian

students proportion, compared to the strong upward skew in the other two groups. Six of the seven Unit schools have Asian proportions of 7% to 13%. The median school proportions for Pacifika students are low and statistically indistinguishable across the three school groups (1-2%).

*Figure D-13 Comparison of the proportion of students that identify as European/Pākehā for the 7 Study-Unit, 15 Study-No Unit, and 505 Non-Study senior-secondary-student-inclusive schools.*




The contrasts among the school groups are quite different at the level of individual students where each ethnicities' school proportions are weighted by its number of students. In the Unit schools. The variability of proportions is too great for all ethnicities apart from Pacifika to infer any significant difference between medians of any of the groups of schools. It is possible however to identify segregation-type bias based on the student population proportions for each ethnicity and the 95% confidence intervals of the estimated median student experienced proportions of own-ethnicity. These values are displayed in Table D-19. Confidence intervals that are entirely above the population proportion are coloured blue to indicate Inclusive type segregation is experienced by the majority of students. Those intervals entirely below the population proportion are coloured orange to indicate Exclusive type segregation. The green-coloured confidence intervals indicate Neutral segregation where the median population proportion falls within the interval.

All ethnicities commonly experience inclusive segregation to some degree within the large group of All-Other schools. European/Pākehā students are inclusively segregated and most experience being the majority ethnicity in all three groups. Māori students experience a neutral segregation range in both study groups. Asian students are the only ethnicity of the four analysed to experience exclusive segregation in the Unit schools and neutral segregation in the No-Unit schools. This is possible because six of the seven Unit schools share a similar Asian student proportion of around 9%, compared to their overall population proportion of 15%. Pacifika students experience strong inclusive segregation in the Unit schools group and neutral segregation in the No-Unit schools. Eighteen of the Study group schools had Pacifika proportions between 1% and 12%. One school had a proportion of 60%, three had 0%. These four outlier schools are all in the Unit group which explains its extraordinary 60% median experienced proportion of own ethnicity for Pacifika students. It is also worth noting that 'Asian' and 'Pacifika' are aggregate ethnicity categories for what are in reality many unique ethnic and cultural origins.

*Figure D-14 Comparison of the proportion of students that identify as Māori for the 7 Study-Unit, 15 Study-No Unit, and 505 Non-Study senior-secondary-student-inclusive schools*

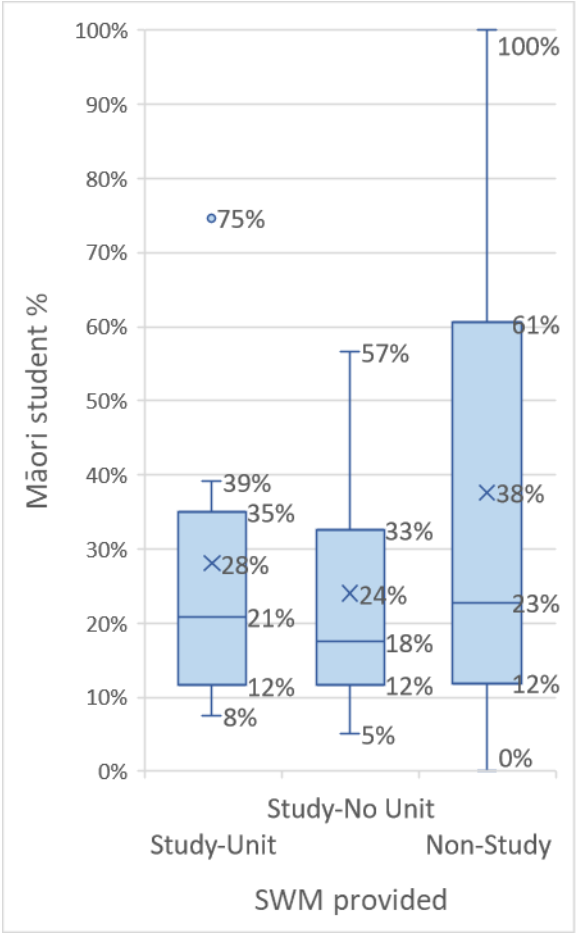



*Table D-19 Segregation bias for the Unit, No-Unit, and All-Other schools based on Overall population proportion and 95% informal confidence interval on the estimated median student experienced proportion of own-ethnicity. Blue, Orange, and Red represent Inclusive, Neutral, and Exclusive segregation respectively.*

| | Overall population proportion | 95% confidence interval for median experienced ethnicity% | | |
|---|---|---|---|---|
| | | Unit | No-Unit | All-Other |
| European/Pākehā | 48% | 59-89 | 61-77 | 60-62 |
| Māori | 24% | 21-41 | 10-36 | 29-36 |
| Asian | 15% | 6-12 | 11-27 | 23-27 |
| Pacifika | 9% | 60-60 | 4-9 | 21-28 |

The Unit schools group displays a more diverse pattern of student own-ethnicity experience than either the No-Unit or All-Other groups. European and Pacifika students experience inclusive, Māori neutral and Asian students exclusive segregation. The 60% Pacifika median could even be described as idiosyncratic since it depends entirely on the inclusion of one school. The under-representation of

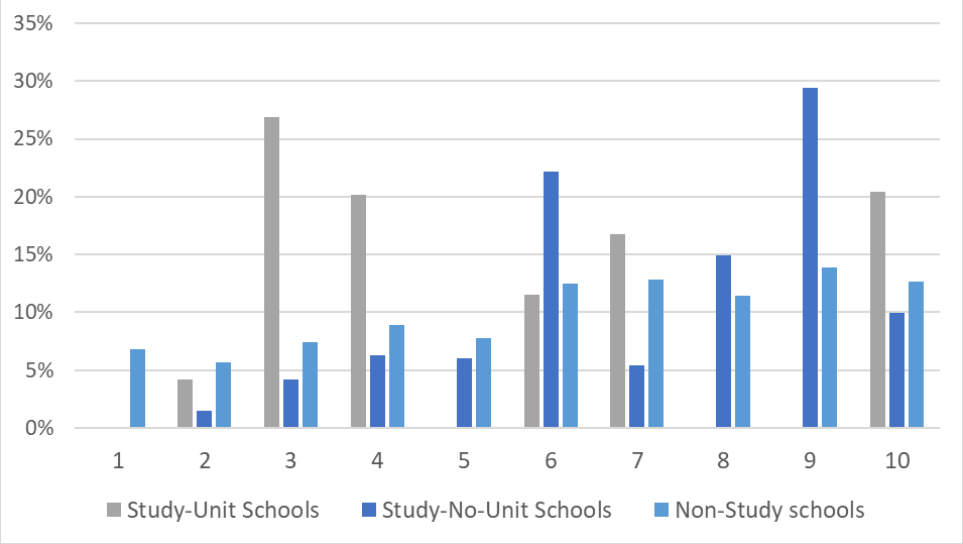
Asian students however appears to be more systematic and is perhaps related to the sustainability and wellbeing direction of this research.

### *D-1.2.4 School Decile*

Although the socioeconomic mean decile difference between the Study schools as a whole and the All-Other group was statistically significant, there are no meaningful differences in mean decile ratings among the Unit (6.0), No-Unit (6.5), and All-Other schools (5.1). The spread of deciles is broad in all groups. The bimodality in the frequency distribution for the All-Other schools over the ten decile ratings observed in Figure D-7 is apparent again in the No-Unit group but not for the Unit group which is too small at just seven schools.

The socioeconomic comparisons are similar when school deciles are weighted by their total rolls. The lower decile schools in the Study-Unit group are larger than the higher decile schools in direct contrast to the No-Unit group which skews the two distributions in opposite directions. The separation of these two distributions is shown in Figure D-15 along with the overall distribution for the All-Other schools.

*Figure D-15 Percent of Students vs Decile Rating distributions for the 7 Study-Unit schools, 15 Study-No Unit, and the 478 Non-Study schools that have ratings.*




Nevertheless, both medians and means among the three groups are statistically indistinguishable at a 95% level of confidence due to their underlying variance and the small sample sizes. The mean student deciles, due to the opposite skew of total rolls in the two Study groups, are 5.6, 7.3, and 6.2 for the Unit, No-Unit, and All-Other schools respectively. The median values are distinct being 4, 8, and 7. As for the comparison of total rolls and ethnic proportions, the Unit schools are more like the All-Other schools, than the No-Unit schools whose students experience higher median and mean deciles. This is because the two largest Unit schools are also lower decile while the opposite is true for the No-Unit schools. These two schools are also distinct from the other Unit schools in terms of their character and the collegial situations of their teacher participants as we shall see in the following section.

### *D-1.2.5 School Character*

In Section D-1.1 we saw that the Study schools were more likely to be 'Mainstream Secondary' than 'Special Character' schools while the reverse was true for the All-Other schools. The effect was statistically significant although not particularly strong. There is however a strong and reverse association between the seven Study-Unit schools, which are predominantly (71%) 'Special Character', and the fifteen Study-No Unit schools which are predominantly (73%) 'Mainstream Secondary'. The actual numbers for this association are shown in Table D-20 and the proportions in Table D-21. The association is statistically significant (Fisher's-exact test 93% confidence) and strong (Cramer's-V statistic 59%). These findings put together suggest that, consistent with the name, 'Special Character' schools cannot be considered to be as homogenous a group as we might assume 'Mainstream Secondary' schools are, and that their special character includes their orientation toward Sustainability and Wellbeing education.

When the table cells are weighted by Total student roll numbers the association is slightly weaker—due to the higher mean Total Roll (almost double that) of the Mainstream Secondary schools,—although it is still statistically significant and moderately strong (Cramer's-V statistic 37%). 53% of the Unit school students are in Special Character schools compared to the overall proportion of 30%, as shown in Table D-22.

*Table D-20 Comparison of the numbers of Study-Unit and Study-No Unit schools by School Character*

| | **Study-Unit schools** | **Study-No Unit schools** | **Total** |
|---|---|---|---|
| **Special Character** | 5 | 4 | 9 |
| **Mainstream Secondary** | 2 | 11 | 13 |
| **Total** | 7 | 15 | 22 |

*Table D-21 Comparison of the proportions of Study-Unit and Study-No Unit schools by School Character*

| | **Study-Unit schools** | **Study-No Unit schools** | **Total** |
|---|---|---|---|
| **Special Character** | 71% | 27% | 41% |
| **Mainstream Secondary** | 29% | 73% | 59% |
| **Total** | 100% | 100% | 100% |

*Table D-22 Comparison of the proportions of students in the Unit and No-Unit schools by School Character*

| | Study-Unit schools | Study-No Unit schools | Total |
|---|---|---|---|
| **Special Character** | 53% | 25% | 30% |
| **Mainstream Secondary** | 47% | 75% | 70% |
| **Total** | 100% | 100% | 100% |

Section D-1.1, Table D-11, showed that the 'Mainstream Secondary' schools outnumbered the 'Special Character' schools within the Study group of schools and had a substantially (although not statistically significant) lower mean decile rating. In this section, we have found that 'Special Character' schools outnumber the 'Mainstream Secondary' schools within the seven Study-Unit schools and yet as a group, the Study-Unit schools have a lower mean decile rating when weighted by their total rolls. This apparent contradiction is resolved by noting that the 15 Study schools which remained in the No-Unit group were those with higher decile ratings, particularly among the Mainstream Secondary schools, as shown in Table D-23 (highlighted), and also had higher total rolls, as shown in Figure D-11. Furthermore, the two largest schools in the Unit group were both 'Mainstream Secondary' with deciles of just 3 and 4. It is worth noting that, unlike the other five 'Special Character' schools, the teachers at these schools, Deb and Nicola, were working within institutional settings that had no school-wide collegial commitment to sustainability and wellbeing education, with a small subset of students for whom their cross-curricular approach and educational goals were deemed appropriate by their school leaders. Both Deb and Nicola had moved on and were working in or with other schools by the end of 2022.

*Table D-23 School mean decile ratings by School character, Authority and Type for the Study-Unit and Study-No Unit schools.*

| School Character | School Authority | School Type | Study-Unit schools | Study-No Unit schools | Overall Mean | No. Schools |
|---|---|---|---|---|---|---|
| **Special Character** | NA | Composite | 2.0 | | 2.0 | 1 |
| | Private: Fully Registered | | 10.0 | 10.0 | 10.0 | 3 |
| | State: Integrated | | 6.0 | 8.5 | 7.7 | 3 |
| | State (special definitions) | | 7.0 | 5.0 | 6.0 | 2 |
| **Special Character Overall mean** | | | 7.0 | 8.0 | 7.4 | 9 |
| **Mainstream Secondary mean** | | | 3.5 | 6.0 | 5.6 | 13 |
| **Overall** | | | 6.0 | 6.5 | 6.4 | 22 |

### *D-1.2.6 Urban-Rural*

Three of the twenty-two study schools were classed as rural—actually minor-urban by the New Zealand Ministry of Education (MoE's) definition. As shown in Table D-24, none of these schools is in the Study-Unit group

*Table D-24 The numbers of Urban and Rural Study schools in the Unit-and No-Unit groups of secondary student-inclusive schools.*

| | **Unit Schools** | **No-Unit Schools** | **Total** |
|---|---|---|---|
| Urban | 7 | 12 | 19 |
| Rural | | 3 | 3 |
| **Total** | 7 | 15 | 22 |

According to the Fisher Exact test (1-tailed), the probability of this outcome is high at 30%, given the distribution of marginal totals in this table. However, this probability alone is inconclusive since there were only three rural Study schools in total and Cramer's-V statistic for this table is 27% indicating a low to moderate association between the Study groups of schools and their urban-rural location. When the number of students is taken into account, however, the association is statistically more significant and moderately strong (Cramer's-V statistic is 30%). The correlation of rural schools with small total rolls appears to not be a factor in their underrepresentation among the Unit schools as it was among the Study schools as a whole since these three schools had rolls of 274, 734, and 981, all above the median for Rural schools in general. All three of these teacher participants (Anthony, Bronwyn, and Lucy) gave the SWM framework domains usefulness ratings for thinking about Sustainable Wellbeing Education of 'Good' to 'Excellent' in the first Delphi survey round. Bronwyn and Lucy followed up with 'Very Good' and 'Excellent' ratings for the SWM framework subdomains in the second Delphi survey round (in which Anthony didn't participate). These evaluations suggest that these teachers' failure to follow up with SWM Unit outlines for the study had more to do with external factors than any personal rejection of the SWM concept, and their rural location could have played some part in that. In the second Delphi survey round, Bronwyn made this consideration explicit in responding to the request for "Community factors that could constrain Local Community support for a Sustainable Wellbeing Metacurriculum in our School".

> Connecting students and community geographically. Some conservative views about environmentalists - we are a farming community that usually votes Blue!

The caveat regarding the 'fuzziness' of the 'Urban/Rural' definition mentioned in Section D-1.1.6 also needs to be kept in mind. Several participants that ended up in the No-Unit group are from provincial towns categorised as Urban but serving a largely rural community. The converse was also true with one Unit school serving a rural locality with a listed population of just 5,890.

### *D-1.2.7 University Entrance and NCEA Level 2 Attainment*

As observed for the comparison of academic achievement between the Study and All-Other schools in the section, the 2022 NCEA Level 2 and University Entrance results obtained from NZQA show that there are also no significant differences in attainment rates among the Study-Unit, Study No-Unit and All-Other schools for either of these qualifications. The median NCEA Level 2 cumulative attainment

rate for year 12 students is between 81% and 85% for all three groups. The median University Entrance cumulative attainment rate is between 52% and 54% for both the Unit and No-Unit schools, and 44% for the All-Other schools.

*Figure D-16 NCEA Level 2 Cumulative attainment rate comparison in 2022 for year 12 students for the Study-Unit, Study No-Unit and Non-Study schools*

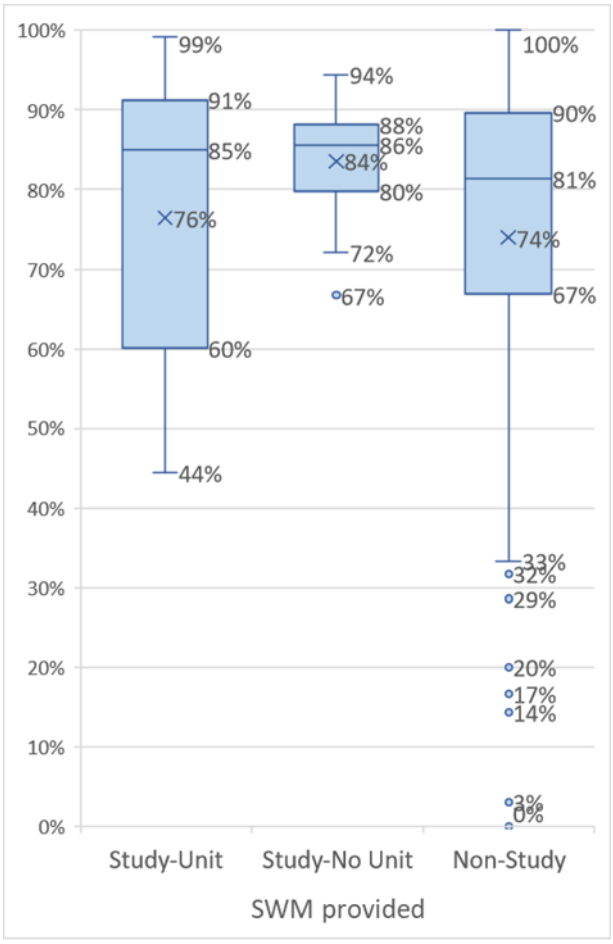



*Figure D-17 University Entrance Cumulative attainment rate comparison in 2022 for year 13 students for the Study-Unit, Study No-Unit and Non-Study schools*

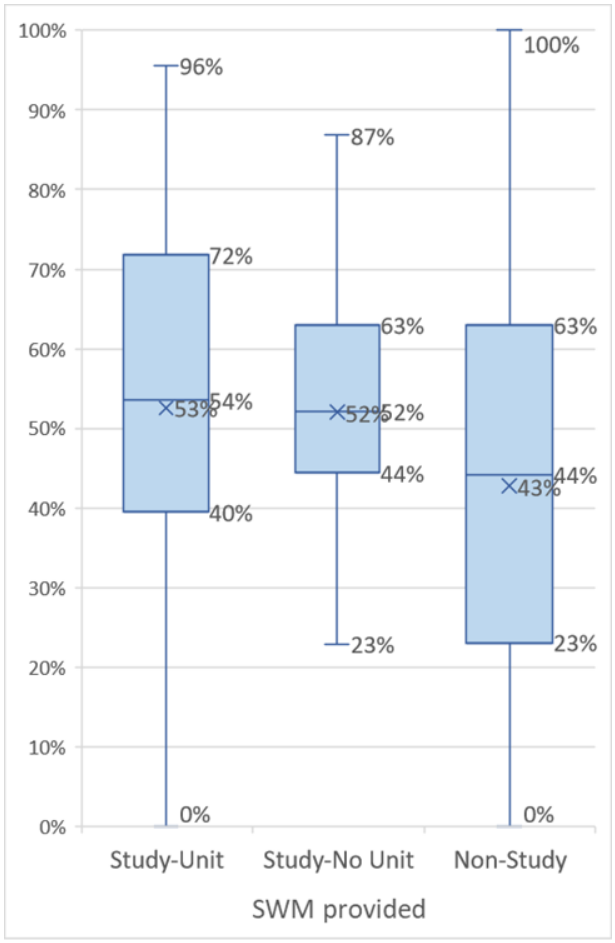



Figure D-16 compares NCEA Level 2 cumulative attainment rates for year 12 students and Figure D-17 University Entrance cumulative attainment rates for year 13 students among the Study-Unit, Study No-Unit and All-Other schools. It should be noted that data for Daniel's Trades Academy was unavailable from NZQA so there are only six schools in the Unit group in these figures. The spread of values in the Unit group is broader than in the No-Unit group with the Unit maximum and upper quartile being above and the minimum and lower quartile being below their corresponding points in the No-Unit distribution. Again, because qualification attainment rates are not correlated with Total School rolls the school attainment rates experienced by students are distributed in a way very similar to those of the schools themselves with similar medians and means.

### *D-1.2.8 Summary*

The seven Study-Unit schools can be characterised in some ways as being more like the general population of senior secondary student-inclusive schools—as represented by the 505 schools of the All-Other group—than the fifteen schools of the teachers who completed the first two Delphi rounds

but then withdrew from the study before providing a complete Sustainable Wellbeing Metacurriculum course or project outline (the Study-No Unit schools). The Unit schools group also has important unique characteristics as summarised below. All differences highlighted in the following summary list are statistically significant at the 95% level of confidence or better unless otherwise stated.

The seven Study-Unit schools:

- Have a significantly lower median total roll (641), than the No-Unit schools (981). Their Total Rolls range from about 100 up to 1,000, compared to the No-Unit schools' range of about 200 up to 2,000;
- Have a Total Roll distribution that is slightly skewed downwards which means that the school level median roll (641) is comparable with the median student-experienced Total Roll (690) in contrast to both the No-Unit and the strongly upwardly skewed All-Other groups of schools where the median school roll is well below what most students experience;
- Include no Boys-only schools, two Girls-Only schools, and five Co-Ed schools with relatively small total rolls which leads to a significant predominance of female over male students in the Study-Unit schools (73:27) compared to the Study No-Unit schools (55:45);
- Have a statistically similar median proportion of European/Pākehā students (53%) to that of the 505 All-Other schools (49%). The No-Unit group median (65%) is however significantly above the All-Other schools' median. When school proportions are weighted by their Total Rolls, European/Pākehā students are seen to experience an inclusively segregated ethnic environment across all groups with (statistically equivalent) median experienced own-ethnicity proportions of 74%, 69%, and 61% in the Unit, No-Unt, and All-Other groups respectively. European/Pākehā are the only student ethnic group to experience majority median own-ethnicity experiences in any of the three groups of schools;
- Have statistically similar median proportions of Māori students to the No-Unit and All-Other groups of schools (21%, 18%, and 23% respectively). The three distributions are all upwardly skewed, particularly the All-Other group meaning that the top half of schools by Māori proportion have very high Māori proportions (67 schools are at 98%-100%) and small total rolls. High Māori proportion schools are underrepresented in both of the Study groups but particularly in the no-Unit group of schools.
- At the individual student level, display a diverse mix of median segregation experiences for different ethnicities; inclusive segregation for European/Pākehā and Pacifika, neutral for Māori, and exclusive for Asian students, the only exclusive segregation for any ethnicity in any of the three groups of schools. The No-Unit group displays neutral segregation for all ethnicities apart from European/Pākehā, as noted above, while all ethnicities experience inclusive segregation in the All-Other group.
- Have a statistically comparable mean socioeconomic decile rating (6.0) to the No-Unit group (6.5) and the All-Other schools (5.1) as a result of their smaller sample sizes even though the Study group of schools as a whole have a significantly higher mean decile (6.4) than the All-Other schools. When school decile ratings are weighted by Total School rolls the Study-Unit group's mean experienced school decile is lower at 5.7 than the No-Unit, and All-Other groups at 7.3, and 6.2 respectively. This is because the largest Unit schools are also in the lowest decile bracket of this group while the opposite is true for the No-Unit schools. Nevertheless, these contrasts are also not statistically significant.
- Are more likely to be year 1 to 13 'Special Character' as opposed to year 7-15 'Mainstream Secondary' (71% to 29%) than the No-Unit schools (27% to 73%). In this, they are even more biased toward 'Special Character' than the general population of All-Other schools (61% to 39%). At the individual student level, 53% of the Unit group students are in 'Special Character'

schools whereas 75% of the No-Unit group students are in ‘Mainstream Secondary’. The two largest Unit schools are not only low decile but are also the only mainstream secondary schools in this group;

- are all located in Urban rather than Rural areas. When the number of students involved is taken into account the association of the Unit group of schools with Urban location is statistically significant and moderately strong. All three of the Rural school teachers in the Study that joined the No-Unit group gave positive evaluations of the emerging Sustainable Wellbeing Metacurriculum framework in the first and second rounds of the study suggesting their failure to provide Unit outlines is related to external factors which could well include their schools’ Rural location. The difficulty in defining ‘Rural’ schools accurately in terms of their most influential local communities could also have led these findings to underestimate the Urban/Rural alignment with the Unit and No-Unit groups respectively.
- Have attainment rates in NCEA Level 2 and University Entrance that are statistically indistinguishable from the Study No-Unit and All-Other schools, although the range of rates for both qualifications is much greater for the Unit group. The median cumulative attainment rates for the Unit schools in 2022 were 85% in NCEA Level 2 for year 12 students and 54% in University Entrance for year 13 students.

# Appendix E for Chapter 7: Discussion

*Table E-1 The three domains and nine subdomains of the SWM framework human-societal level, showing the self-similar relationships between Layer 2 and Layer 3 in each subdomain and their joint focus for the pursuit of Sustainable Wellbeing, Layer 1*

| | | **Principal Domain** | | |
|---|---|---|---|---|
| | | **E Ecosphere** | **S Social Justice** | **C Cultural Vision** |
| **Secondary Domain** | **Ecosphere**<br>**Layer 2** in relation to…<br>**Layer 3 = E** | **EE: Cyclic Maker-Consumers**<br>E: Local/Home, land, water and air use …<br>E: The Local, Regional, and Global Ecosphere | **SE: Whanau and Community**<br>S: Whanau relationships …<br>E: The local, Regional, and Global Ecosphere | **CE: Our Cultural Inheritance**<br>C: Our birth culture from Past generations …<br>E: The local, Regional, and Global Ecosphere |
| | **Social Justice**<br>**Layer 2** in relation to…<br>**Layer 3=S** | **ES: Regenerative-Cultivators**<br>E: Regional, land, water and air use …<br>S: Whanau & Community, Citizenship, and Trans & Inter-nationality | **SS: Equity, Rights and Responsibilities**<br>S: Citizenship …<br>S: Whanau & Community, Citizenship, and Trans & Inter-nationality | **CS: Others' Cultures and Worldviews**<br>C: Contemporary alternative worldviews …<br>S: Whanau & Community, Citizenship, and Trans & Inter-nationality |
| | **Cultural Vision**<br>**Layer 2** in relation to…<br>**Layer 3** | **EC: Kaitiaki Guardians**<br>E: The Global Ecosphere …<br>C: Humanity's Past, Present, and Future trajectory | **SC: Power and Influence**<br>S: Trans & Inter-national state & private organisations …<br>C: Humanity's Past, Present, and Future trajectory | **CC: Cultural Evolution and Individual Agency**<br>C: Inspirations, Visions & Initiatives for Future generations …<br>C: Humanity's Past, Present, and Future trajectory |