Teacher identity, activism, and empowerment

Entanglements with Climate in Aotearoa, New Zealand

A thesis

Submitted in partial fulfilment

of the requirements for the degree

of

Doctor of Philosophy in Education

at

The University of Waikato

by

Thomas Alexander Richard Everth

THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

2024

ABSTRACT

This thesis chronicles the perceptions and desires of seventeen climate activist secondary school teachers in Aotearoa, New Zealand, in the context of the climate emergency and draws conclusions about the potential of teachers and education to be essential cultural change makers toward a sustainable future. The participants self-identified as Climate Activist Teachers (CATs). They had developed a sense of urgency, perhaps even despair, over the climate emergency, the scale of the task ahead to mitigate and adapt to it, and the lack of political progress so far in moving society forward. The participants sensed the fundamental importance of education in promoting the transformative discourse society needs to embrace in light of the climate change predicament. They perceived their role and responsibility as educators in this context in a broad sense and saw themselves as activists and trailblazers but also as frustrated, disempowered and grieving. By applying a DeleuzoGuattarian analytical and methodological framework, the analysis of the participants' perceptions and desires generated specific insights into opportunities to deterritorialise and decode educational institutions in order to promote a meaningful engagement with the fundamental questions of human relations with the more-than-human world.

The impetus for the thesis arose in 2019 as a culmination of several years of personal struggle as a high school science and mathematics teacher to come to terms with the predicted severity of the climate emergency and the lack of meaningful engagement of the education system with this existential threat to humanity at that time. I gave a conference paper at the New Zealand Association for Research in Education (NZARE) conference in 2019 on the urgent need for education research to engage with the climate emergency. As it turned out, I was the lone voice at this large conference who as much as mentioned climate change. I decided then to begin this PhD study.

Starting from my own perceptions, I sought out seventeen other high school teachers, including some working in teacher education and professional development, who had comparably strong convictions on the severity and threat of climate change and engaged them in a longitudinal study with a qualitative research methodology that adopted a grounded theory approach. Guided by the astounding richness of initial long and unstructured interviews with the participants and inspired by the philosophy of Deleuze and Guattari and the work of St. Pierre and Fox and Alldred, the methods of the research evolved in an iterative process of analysis of findings, distilling of conclusions, and participant interactions, resulting in a rhizomatic presentation of this thesis.

The data gathered during this research reveal evidence of the deterritorialising effect of the climate emergency on the participants' perceptions of themselves as teachers and their outlook on

life. The participants perceived the lack of systemic policy in the education system to address the challenges of climate change as deeply frustrating and causing cognitive dissonance between their rational and emotional understanding and the lack of action by all levels of the education system and society at large. Many participants felt isolated within their schools yet were deeply motivated to be changemakers toward a sustainable future.

The significance of the study lies in the evolution of a theoretical perspective to grapple with the socio-philosophical implications of the climate emergency for society and education. Assemblage theory and applying Deleuze and Guattari's schizoanalysis proved productive in understanding how stratified structures in society and the education system work through territorialisation and coding. This understanding can aid the development of perspectives for system analysis and change. Through the lens of Deleuze and Guattari's concepts, the impact of the climate emergency on society is revealed as a profoundly deterritorialising process, and climate activist teachers are seen as potential prototypical nomad war machines in Deleuze and Guattari's sense. Nomadology then emerges as a way of escaping from the entrapments in dysfunctional societal strata and constructs as a response to the climate emergency and the unfolding Anthropocene collapse scenarios and as a way to understand the individual's potential as cultural and societal change makers. The call by Deleuze and Guattari for new humans leads to a posthumanist vision of post-Anthropocene people and the teachers who will educate them into being.

In the summary of the participants' narratives, the thesis gives detailed suggestions for school leadership to engage proactively with climate change education as a way to transform education from within the system instead of waiting for a radical vision of transformative education to emerge from the Ministry of Education and the central government.

Figure X-1-1

Earth and Climate Change

Note. This image was generated by DALL-E, Openai.com.

DEDICATION

This thesis is dedicated to my children, Marie and Julian. You are two wonderful people, and I am proud of your path in life. I trust your generation will do better than ours to care for this wonderful planet. This thesis is also dedicated to my late mother, Jutta. She was a beginning teacher in Germany during the hard times of WWII. Her stories profoundly influenced the way I view the world. From a young age, she introduced me to science and the deep questions of existence. She travelled the world with me and laid essential foundations for my path in life.

ACKNOWLEDGEMENTS

This doctoral thesis was made possible due to the enthusiastic engagement of my 17 participants. I cannot name you here in person, but you know who you are, and you will recognise your pseudonyms in this thesis. I truly enjoyed working with you and thank you for the generous amount of time you gave to this project. Your collective narratives generated over 300,000 words of transcripts and have inspired this thesis and several publications. Your ideas and stories made a valuable contribution to promoting climate change education in Aotearoa and beyond.

I am immensely grateful to my academic supervisors, Laura Gurney, and Chris Eames, for their encouragement, guidance and contributions to several publications that arose from the work of this PhD research. Chris Eames, I am grateful you encouraged me to start this thesis. Your experience in the field of sustainability education is invaluable, and your kind and humorous nature made working with you a delight. Laura, your enthusiasm has been infectious, and your interest in philosophy and the metaphysics of quantum mechanics provided resonances for some truly exiting work. I cannot imagine a better team of supervisors!

To my fellow doctoral students, Ria Bright, Thea DePetris, and Chris Morey, you made these three years a true pleasure. Sounding out ideas in our bi-weekly zoom catchups, common conference sessions, and stays in Hamilton made PhD study intellectually inspiring and rewarding. Ria Bright, thank you, especially for working with me on our shared paper. Having you three as peers made these years very special for me.

I want to thank my friend Dr Margaret Magnus for the many deep discussions on philosophy, cognition, and linguistics during a five-year stay in the USA while working with her team on computer linguistics. This time was influential in the development of my thinking and academic pursuits.

During the last months of editing my thesis, I was appointed as a lecturer at the EcoQuest Centre for Indigeneity, Ecology, and Creativity in Kaiaua, Aotearoa, lecturing Ecology and Climate Change for tertiary students from the USA. I am grateful for the kind support of my work by the academic leadership team of EcoQuest, Director Dr Charles Royal, Ria Brejaarta and Jono Clark.

Finally, I sincerely thank my family for their patience during my long hours working on my laptop, writing and researching, and my absent-mindedness during countless hours of introspection.

PUBLICATIONS GENERATED IN CONNECTION WITH THIS PHD RESEARCH

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. (2021). 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. (2022). On Snakes and Ladders. *Waikato Journal of Education, 27(2), 11–17*. https://wje.org.nz/index.php/WJE/article/view/919

Everth, T., & Gurney, L. (2022). Emergent Realities: Diffracting Barad within a quantum-realist ontology of matter and politics. *European Journal for Philosophy of Science, 12(3), 51*. https://doi.org/10.1007/s13194-022-00476-8

Everth, T., Gurney, L., & Eames, C. (2022). Assemblage drawings as talking points: Deleuze, posthumans and climate-activist teachers. *Australian Journal of Environmental Education, 1–14*. https://doi.org/10.1017/aee.2022.48

Everth, T. (2022). Stop tinkering around the edges: a call for the deterritorialisation of assessment praxis in the age of Anthropocene predicaments. *Set: Assessment Matters, 16.* https://doi.org/10.18296/am.0057

PROLOGUE

The philosophy underlying this thesis is inspired by the work of Deleuze and Guattari, whose ideas provide a befitting plane of reference from which to see and speak in our time. Their core terminology is introduced and referenced in the terminology section, and their philosophy will be contextualised in the theory chapter. Readers less familiar with DeleuzoGuattarian terminology may wish to jump ahead to the terminology section before starting with the introduction chapter. The work of Deleuze and Guattari, as Saldana and Stark (2016) argued, not only presaged the existential anthropogenic [human-caused] challenges of our time but also provided valuable concepts and inspirations for dealing with them. David Cole (2022) goes much further in stating that promoting the understanding of Deleuze and Guattari's philosophy in the context of climate change education may be the most important work to be performed with respect to the future of education.

This thesis also draws encouragement from St. Pierre (2018b, 2019, 2021) to be unrestrained by conventions on qualitative research and its presentation, where such constraints would be a hindrance.

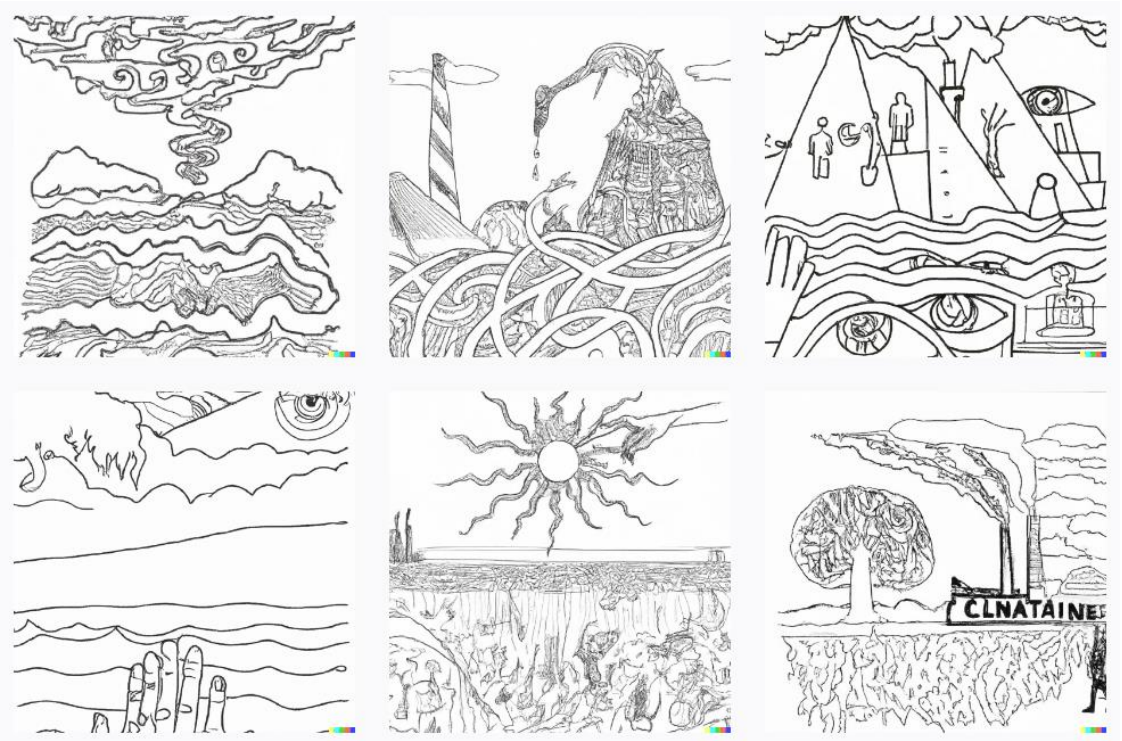
The place of this research is Aotearoa, New Zealand, and most of the work of this thesis was undertaken from my home in the town of Whitianga on the east coast of the Coromandel peninsula on the lands of Ngāti Hei, the tangata whenua [indigenous people], of this land. In this thesis, from here on forward, I will refer to New Zealand by its Māori name, *Aotearoa*.

A NOTE ON ILLUSTRATIONS

The philosophy of Deleuze and Guattari is not only coming to power when connecting with the context of this thesis but is interconnected with modern art. In his book on Francis Bacon, Deleuze (2005) argued that "[t]he task of painting is defined as the attempt to render visible forces that are not themselves visible" (p. 56). It is, therefore, befitting that this thesis contains several surrealist artworks that attempt to illustrate and render visible some of those forces that Deleuze and Guattari described in their philosophy. Unless otherwise stated, these artworks are all originals generated for this thesis by the DALL-E OpenAI drawing environment (Marcus et al., 2022; OpenAI, n.d.) by prompting the AI with DeleuzoGuattarian terminology and contemporary issues and asking it to generate surrealist line drawings. The results were astounding. Using AI to generate these illustrations was a post/trans-humanist activity. Here, a human-made but now largely autonomous AI generates illustrations that prompt connections to the subconscious and hidden. OpenAI owns images generated by DALL-E. However, the company permits the non-exclusive use of these images for commercial or non-commercial purposes.

Figure X-1-2

Collage of Climate Change Drawings



Note. Collage of climate change drawings, generated by DALL-E, Openai.com

THESIS STRUCTURE

After the customary introductory chapters 1 to 3, chapters 4, 5 and 6 weave findings, analysis and reflexions into rhizomatic narratives. Chapter 4 focuses on the perceptions of the milieu in which the participants saw themselves, while the focus of Chapter 5 is on the desires of the participants and their potential as nomad war machines and changemakers. Chapter 6 discusses summary findings from closing interviews with the participants. Chapter 7 discusses the implications of this research for education and summarises the academic contributions of this research.

Figure X-1-3

Thesis Structure

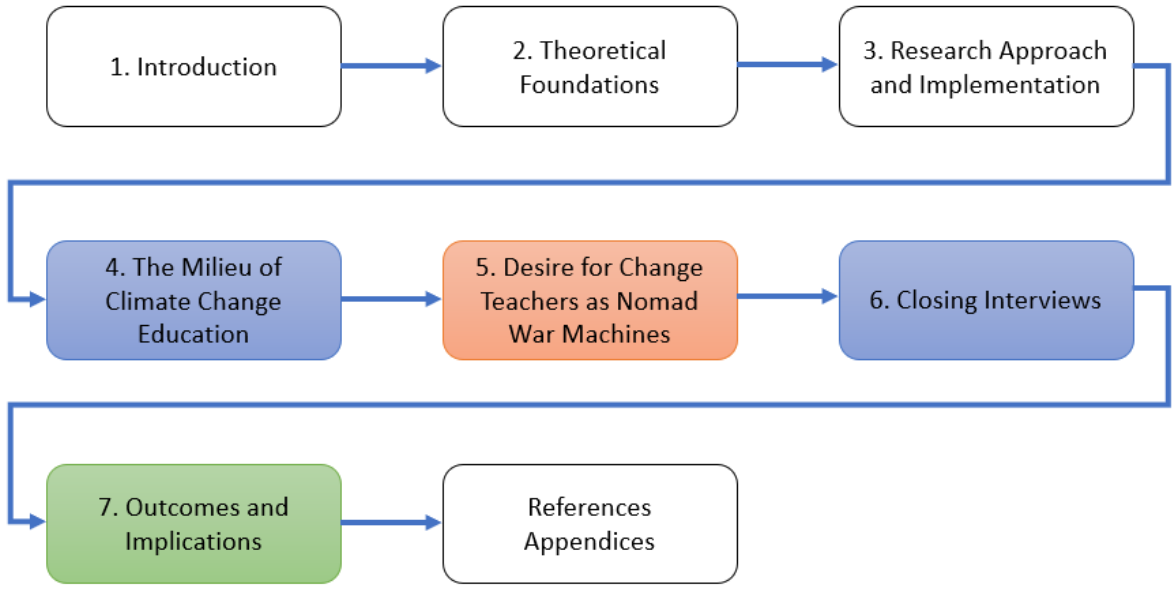


TABLE OF CONTENTS

FIGURES

TABLES

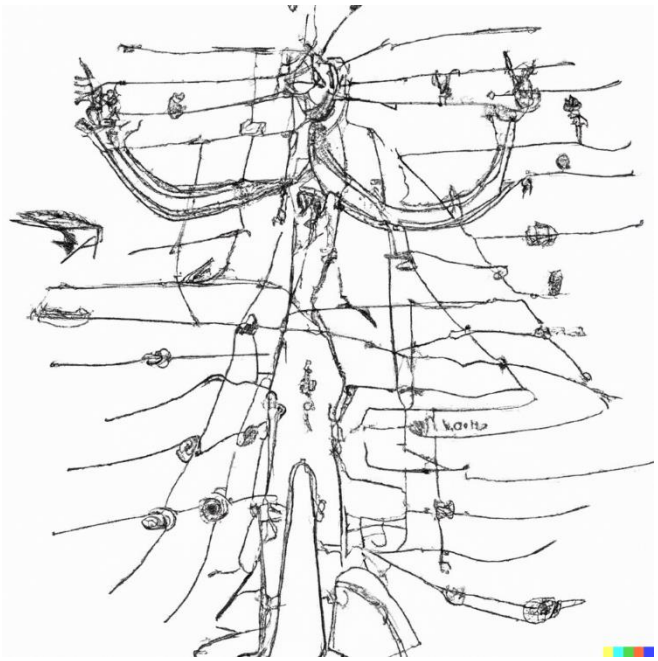
1 INTRODUCTION

> If the Earth becomes uninhabitable by humans, nothing else matters. Literally, nothing else matters. So, this is our number one problem that we need to do something about.
>
> (Karl, pseudonym, research participant, Interview #1)

This chapter introduces the thesis by following the lines of flight (Figure 1-1) along which this research was conceptualised and produced. It contextualises the research within countless interwoven lines of accelerating deterritorialisations, reterritorialisations, disruptions, explorations, extinctions and becoming during this critical time of Anthropos in the Anthropocene.[1]

Figure 1-1

Lines of Flight



Note. Lines of Flight, image generated by DALL-E, Openai.com

This research explores how Climate Activist Teachers (CATs) face and negotiate the challenges and opportunities of their role as mediators between the current and future generations with regard to the climate change emergency and the need for a global transformation of society to attain a sustainable future. While this research is centred on the issue of climate change education, it is set in

[1] The Anthropocene is a proposed new geological epoch, signalling that anthropogenic impacts are now the dominant force on Earth systems. The term Anthropocene was became popularised through the work of Crutzen (2010). See also Section 2.3.2.

the broader context of education for a sustainable future and the predicament of unsustainable Anthropocene trajectories. CATs are identified as teachers who have developed a sense of urgency, perhaps even despair, over the climate emergency,[2] the scale of the task ahead to solve it, and the lack of progress in moving society toward an effective engagement with climate change mitigation. They sense the fundamental importance of education in promoting the transformative discourse society needs to embrace and understand their role as educators, activists, and trailblazers. "Climating" (Verlie, 2017) is their pursuit.

This research focuses on the perceptions and desires of the fifteen participating CATs. The thesis asks what we can learn from CATs by engaging them in productive critical discourse and analysing their reported experiences, ideas, sorrows, and hopes. The participants in this study were high school teachers or educators working in the professional development and support of high school teachers who shared my deep concerns about the climate emergency. As I consider myself a CAT, this research has had an autoethnographic component made explicit throughout the thesis in reflexions, themes, storylines, and lines of flight, connecting my thinking and emotions with those of my participants.

1.1 About Myself

I have a master's degree in physics from the University of Düsseldorf in Germany and a Graduate Diploma in Teaching from the University of Waikato, Aotearoa. As a physicist, I have developed a realist worldview and a deep interest in ontology and metaphysics. Before sailing to Aotearoa in 1995, I worked internationally in the IT-Industry, including five years in the USA with computer linguists. On my journey to Aotearoa, I engaged in political activism in the 1995 peace flotilla at the French nuclear testing grounds at the Moruroa Atoll. In Aotearoa, I taught Physics, Earth and Space Science, Mathematics and Statistics for eight years at Mercury Bay Area School. At the end of 2019, I resigned from my position as a high school teacher to apply myself to this PhD research project.

1.2 Motivation and Personal Interest

The motivation and personal interest that led to this thesis arise from a rhizome of confluent lines of flight connecting past and current events, timelines, global contexts, and trajectories within the space of possible futures. Some of the significant lines are traced here.

[2] The terms 'climate emergency' and 'climate crisis' are both used in this thesis. Both terms have slightly different connotations and both terms are used in the literature as well as in the participants' narratives. Many justidictions have now recognised that the climate crisis constitutes an emergency, including the government of Aotearoa (New Zealand Parliament, 2020). See also Section 2.3.1.

The stories of my mother told me about her experiences as a beginning teacher in Nazi Germany in Berlin, where she taught Chemistry, Geography and Sports at an all-boys high school during the last years of WWII, kindled an early interest in the role of teachers in times of crises. My mother had to conform to Nazi ideology as part of her job requirements, and any critique of the regime and the war, especially in her role as a teacher, was impermissible. She knew that her students would be drafted into Hitler's insane war upon graduating from her school and as recruits had a life expectancy of perhaps half a year. She pointed to faces in a photo album from a class trip, remembering some of the students' names and if they had fallen shortly after leaving school. The cognitive dissonance she was subjected to in her teaching role would have been extraordinary. Reflecting on her stories today evokes resonances with the trajectories of our time. What is the future our students walk into today, at the edge of what could be a cascading chain reaction of climate tipping points? And what is our role as teachers now?

The publication of the book *The Limits to Growth* (Meadows et al., 1972), which announced the spectre of the coming Anthropocene deterritorialisations (Colebrook, 2020a; Steffen, 2022) to the world, awoke me to the predicament we are in and became one of the key events affecting my thinking. I read the book during the last year of my high school education in Germany in 1975. My engagement with the findings presented by *The Limits to Growth* fundamentally changed my perspectives on life and society. The message of the book seemed clear and inescapable to me. I understood that humanity was on a path to collapse unless significant steps were undertaken to limit growth, phase out humanity's need for non-renewable resources, and curtail civilisation's spiralling environmental impacts.

After graduating from high school, I decided to study Physics because I believed this could be the science that might enable new options and lines of flight out of the constraints described by Meadows et al. (1972). During my master's degree research in Germany, my science interests became entangled with the advance of microprocessors as part of my experimental physics work doing spectroscopy on the vibrational modes of trimeric molecules such as NO_2 and CO_2 and their resonance with light in the infrared bandwidth. Interestingly, while this was not apparent to my research then, the physics I worked on connected to understanding the greenhouse effect. However, after graduating from university and a brief engagement with the nascent solar energy industry, the rise of the digital age drew me on an almost thirty-year detour into business within the software industry. The lure of being part of creating a whole new industry seemed irresistible. My IT career turned me into an international traveller with several years spent in the USA. I lost track of the number of long-distance flights I took during these years, and my contribution to today's climate change was certainly well

above average. I feasted on the exuberant decades that would lead us into the wicked problem of Anthropocene overreach, with climate change as its most consequential current symptom. After five years in the USA, I took a two-year break from my IT work, sailed across the Pacific, and finally settled in Aotearoa.

Finally, in 2010, I left the IT industry behind for good, enrolled in teacher education at the University of Waikato in New Zealand, and became a physics, earth and space science and mathematics teacher. Engagement with questions about the role of science in society was an important aspect of my teacher education. This engagement led to another important line of flight toward the motivation for this thesis. By 2010, climate change had finally made it into the general public debate, thanks in a significant part to Al Gore's (2006) book and movie *An Inconvenient Truth*. However, Al Gore's work also amplified the 'Climate Wars' between those who understood the messages of climate science and a rising wave of climate and science denialists, who were partly funded by fossil fuel interests and greatly amplified by right-wing political forces in opposition to Al Gore and the environmental movement. Raised as a natural scientist, the fundamental role of natural sciences as arbiters of the truth about matters of the Earth systems and climate change, in particular, seemed evident to me. However, teacher education, including the education of science teachers, is situated within the social science academy, which had been strongly influenced by constructivist theories, including radical ideas about the role of ontology and the natural sciences by authors such as von Glasersfeld (2013), Riegler (2001), and the 'post-normal science' theories of Funtowicz and Ravetz (1993). I experienced aspects of the social sciences as having been embroiled in the climate change controversy of the past decades on the deniers' side of the argument (Hansson, 2020). Critical engagement with constructivism in preparation for this thesis triggered a deep ontological quest, including a return to my physics roots (Everth, 2022a) — more on this in section 2.2.3.

The final motivation for my thesis came together during my last year of teaching at Mercury Bay Area School in Whitianga, Aotearoa, in 2019. I remember waking up early one morning on a lovely summer's day, the sun shining into my bedroom window from a beautiful blue sky. Almost instantly, something fundamentally changed for me, like a physical jolt that shook me to the core. It seemed suddenly crystal clear to me that we were not only theoretically driving our planet toward a human-caused extinction event while eventually but surely preventing the same with alternative energy technology and related 'hopium' (Pihkala, 2022), but that an incredible human-made extinction event was actually happening in front of my eyes and would most likely no longer be stoppable. In retrospect, I think that for many years in my subconscious mind, some background process had been continuously trying to compute how humanity might be able to extricate itself from our predicament

while comforting the conscious mind daily that all would probably be well in the end. However, that morning, this background process terminally crashed for good and gave way to a very different realisation. There would be no happy ending, and no viable solution was computable any longer under the presently available inputs. In hindsight, and with DeleuzoGuattarian terminology, I explain this event as a sudden deep deterritorialisation from a virtual territory of a secure future, driven by intelligent technology and powerful public eco-awareness, into a territory of terror, grief and an overwhelming sense of guilt and sorrow. What had we done? What about our children's future? What would become of this fantastic planet we inherited but senselessly squandered in a century of blind madness? Consequently, later that year, I stepped out of my school teaching role and prepared myself for this PhD research with climate activist teachers in Aotearoa, peers who would share my concerns.

Figure 1-2

Climate Change Education

Note. Triptych on Climate Change Education, generated by DALL-E, Openai.com

1.3 Situating this Research

In this section, I provide a brief introduction to the setting of this research in Aotearoa to introduce terminology and a contextual frame of reference with regard to some of the specifics of this country and its educational system. The themes touched upon in this introduction are expanded upon in the relevant chapters of the thesis.

1.3.1 Aotearoa, a Bicultural Nation

Aotearoa is a former British colony and operates as a parliamentary monarchy with the British monarch as the formal head of state. Aotearoa's bi-cultural national identity is constituted through the Te Tiriti [the Treaty] partnership between Tangata Whenua [the indigenous people of Aotearoa] and Tangata Tiriti [the colonial settlers and their descendants and new immigrants], signed in 1840

between the indigenous Māori population and the colonial British Empire (Orange, 2021). Lacking a formal constitution, Aotearoa refers to Te Tiriti as the nation's founding document, and its interpretations form the anchor for the bicultural nature of the country.

The country's colonial history and the historical crimes of the colonialists (Bell et al., 2017; Mulholland & Tawhai, 2011; Mutu, 2019) remain an active matter in the contemporary national discourse and the relationship between the indigenous Māori population and the immigrants and descendants of the colonial settlers, collectively referred to by Māori as the Pākehā. To remind settlers of the treaty obligations, Māori refer to themselves as *Tangata Whenua* (the land's original people), while non-indigenous people are referred to as *Tangata Tiriti* (the people of the treaty). This designation reminds newcomers and settlers that the treaty also contains binding obligations for them today. The Treaty is a living document, generative of questions and avenues of thought that revitalize the relationship between the indigenous and non-indigenous people of this land. Considering the broader implications of indigeneity as a frame of reference for the relationship of people with place and planet, Te Tiriti triggers resonances with precisely the questions humanity must now ask itself in the context of climate change and the Anthropocene. From a perspective of politics and policy, Climate change solutions in Aotearoa must be negotiated following the principles of the Treaty partnership between Māori and the Crown, as the New Zealand Climate Change Commission acknowledged (Climate Change Commission, 2021).

1.3.2 Education in Aotearoa

Aotearoa has an education system predominantly based on public schools and operates on three levels: early childhood, school, and further education (MoE, n.d.-a). School education in English medium schools where the participants worked is based on *The New Zealand Curriculum* (NZC) (MoE, 2007). Secondary school qualifications are issued and assessed by the New Zealand Qualifications Authority (NZQA) under a system of National Certificates of Educational Achievement (NCEA) (NZQA, n.d.). Here, a summary of points of reference, particularly concerning education in the secondary school system of New Zealand, is provided to describe the setting in which the research participants are placed.

1.3.3 Neoliberal School Reform and Standardised Assessment

Following international trends and the rise of globalist neoliberal ideology during the 1990s, the school system in New Zealand underwent a market-oriented reform (Codd, 2005; Gordon, 1992; Woodfield & Gunby, 2003). These reforms led to a shift toward greater outcome measurement and a culture of accountability and, as Codd (2005) argued, moved education closer to the "orbit of economic policy" (p. 193) and resulted in an "erosion of trust and a degradation of teaching as a profession" (p. 193).

Central planning and investment in the education system were closely informed by outcome expectations for the economic growth education would provide downstream. The impacts of these neoliberal reforms are now restraining the ability of the education system to pivot toward greater teacher autonomy and teacher-led climate change education initiatives (Everth & Bright, 2022). I also refer to the detailed discourse on the impact of neoliberal politics on education and the disempowerment of teachers by Evers and Knyeber's (2015) and Lee's (2003) critique of outcome-based education systems. Benade (2011) lamented "the corrosive effects on teacher professionality of the ongoing reform agenda in education in New Zealand since 1989" (p. 151) and argued that "[s]tate-driven neoliberal policy and education reforms are deeply damaging to the mental and moral conceptions teachers have of their work" (p. 151).

Following the neoliberal school reforms of the 1990s, high school education in New Zealand became fundamentally driven by the assessment requirements established by the New Zealand Qualifications Authority (NZQA) and the system of National Certificates of Educational Achievement (NCEA) (NZQA, n.d.). The NZQA is a government agency operating at arm's length from the Ministry of Education. While their task is to provide assessment policies and confer grades to students based on the New Zealand Curriculum (NZC) (MoE, 2007), in praxis, the NCEA assessment system directs much of the enacted curriculum at Aotearoa's high schools (Everth, 2022b). The assessments specified in the NCEA system determine what teachers in New Zealand's high schools must cover in their lessons to lift students' chances of achieving the NCEA credits that will enable pathways for their professional progression, access to scholarships and university placement. Therefore, the standardised NCEA system has restricted teacher-led innovation and limited the scope for deviation of learning context from the assessment contexts within the school calendar (Everth, 2022b). Yoon and Rata (2018) critiqued the NCEA system and the credit-chasing mentality generated by its structure and argued that the outcome focus has corralled teaching into constant sequences of assessment preparation exercises. This observation matches my experience in my teaching roles, where assessment and credit-gathering often took precedence over spontaneity and problem-based cross-curricular and life-like learning. Innovative interpretations of NCEA achievement standards are restrained through narrowly-focussed external moderation by NZQA assessors (Everth, 2022b).

The critique of outcome-focused standardised education is relevant to the work of climate activist teachers. Unless the NCEA system is reformed to assess outcomes relevant to teaching for the climate emergency, there will be insufficient time in students' high school lives to focus on the relevant learning. Learning for the climate emergency is uncharted territory, and it remains unclear how a reform of the system will be able to evolve, bottom-up, through teacher autonomy under a closely managed system of assessment that occupies the majority of class time. For climate activist high

school teachers, the outcome-based NCEA system is adding to the cognitive dissonance, which is already weighing on the health and wellbeing of these teachers. From an autobiographical perspective, I can add to this discussion my personal struggles with the NZQA system of external moderation of internal achievement standards (Everth, 2022b). This system does not operate in a mode of affirmative ethics that promotes teacher creativity and autonomy but forces a normative and unimaginative view upon teachers. A significant proportion of the participants' narratives in this research reflect on the structure of the education system and the issues surrounding the NCEA system of assessments in particular. For a deeper discussion of the NCEA system and my arguments for its necessary reform, I refer to my paper that calls for a deterritorialisation of the assessment system (Everth, 2022b).

1.3.4 Bi-Cultural Status and Education

The bi-cultural status and Te Tiriti have profound implications for the nation's education system (Glynn, 2015). Colonisation resulted in a systematic suppression of Māori culture, language, and traditional knowledge (Skipper, 2020) and the dissociation of Māori culture from formal education, setting in motion systemic failures of the education system for Māori (Hook, 2007). Over the last 50 years, the education system has embarked on a range of programs and initiatives to advance educational success for Māori, with varying degrees of success (Hook, 2007; A. H. Macfarlane, 2015). To this day, the underachievement of Māori in the Western education system remains "chronic and seemingly intractable" (Egan, 2022, p. ii).

Due to recent reforms under Labour Party-led government since 2017, the colonial history of Aotearoa has become a mandated school subject in the curriculum refresh of 2021 (Hughson, 2022), and mātauranga Māori [Māori cultural and scientific knowledge] (Royal, 2008) has been included into the school curriculum and NCEA assessments (Karaka-Clarke et al., 2022; Stewart, 2022b; Tuhiwai Smith et al., 2016). These changes are not without controversy. These educational reforms are contextualised by a growing indigenous resurgence in Aotearoa over the past decades (Cram et al., 2018; Hampton, 2020; Mataira, 2013) and the active exploration of the opportunities and challenges of the nation's bicultural heritage and commitment through the Te Tiriti. Parts of Aotearoa's Pākehā [Non-Māori] society support this indigenous renaissance (Eketone & Walker, 2016). However, for others, it provoked a resurgence of colonialist ideology and populist prejudice, which appears to have gained space in the public discourse and has been instrumentalised by right-wing parties in the build-up to the 2023 elections as a backlash against the reforms of the Labour-led government (Kowhai, 2023; Oldfield & van Veen, 2023; Sherman, 2023). The inclusion of mātauranga Māori into the science curriculum turned out to be particularly controversial. Voices supporting the traditional

Western/Pākehā epistemologies and science disciplines took exception to the inclusion of indigenous concepts in high school science teaching, resulting in a robust debate (Lillis & Schwerdtfeger, 2021; Waitoki, 2022).

The bi-cultural nature of Aotearoa and the ongoing challenges to reform the education system with respect to improving educational outcomes for Māori and the resurgent Māori identity movement provide a productive perspective for the design of climate change education. As I argue below in chapter 2.3.5, climate change and colonisation are intertwined, and the climate change activist movement is finding common ground with indigenous activism globally and in Aotearoa.

1.3.5 Curriculum and Climate Change Education

In its inception, the *New Zealand Curriculum* (NZC) (MoE, 2007) echoed recommendations from the founding international Environmental Education document, *The Belgrade Charter* (UNESCO, 1975). Statements on sustainability became part of the values and principles underlying the NZC and can be found in several subject-specific contexts. The NZC aligns well with sustainability and environmental education and gives flexibility and autonomy to schools and their leadership to reflect the individual character of their respective communities (Bright & Eames, 2022; Everth & Bright, 2022). However, the flexibility offered to schools within the NZC also means that engagement with sustainability and environmental education is not mandated, and the directions in the NZC remain vague. Therefore, the engagement of schools with sustainability and environmental education depends on the school's elected governing arm, the school's Board of Trustees (MoE, 2007, p. 44), and the school's leadership team, and it often relies on poorly supported but motivated individual teachers within schools (Everth & Bright, 2022). The climate activist teachers who participated in this study came predominantly from this group and, in a majority, provided evidence of their schools' marginal engagement with sustainability and environmental education.

In the wake of the school climate strikes initiated by Greta Thunberg (2019), students in Aotearoa embraced the Fridays for Future movement (Fridays For Future, n.d.) and organised the first mass student protests and school strikes in Aotearoa, first in March and later in September 2019. The strikes triggered the education system in Aotearoa to engage with the climate issue and revealed challenges and opportunities for students and educators to engage with climate change education proactively. Based on research with climate activist high school students, Bright and Eames (2020) found that climate change is generating a "soaring level of climate anxiety among youth" (p. 5) and argued that social justice is a crucial lever to generate student engagement together with the need to develop political literacy in students. However, the engagement of schools with climate change was often minimal, and school leadership frequently antagonised students wishing to get involved in

climate activism as part of their school activities (Bright & Eames, 2022; Everth & Bright, 2022). Climate strike youth leaders who participated in the University of Auckland Sustainable Development Goals workshop in 2019 decried the lack of leadership and governance support for climate change education at their schools.

The systemic lack of support for climate change education is a global issue. Kwauk (2020) argued that hesitancy, a lack of knowledge and vision, and structural limitations of school leadership are critical roadblocks. School leadership frequently has a polarising and ambiguous stance towards the treatment of climate change and often fails to take or encourage action by staff and students due to perceived constraints by policies and accountability (Everth & Bright, 2022). This lack of leadership, as Kwauk (2020) argued, promotes a "lukewarm stance on climate action" (p. 8) by the school system and leads to a lack of support at micro and macro levels, ranging from a lack of encouragement of teacher education for sustainability to a lack of direction for institutions to implement meaningful sustainability curricula and matching assessment. This institutional vacuum contributed to the motivation for my research with climate activist teachers.

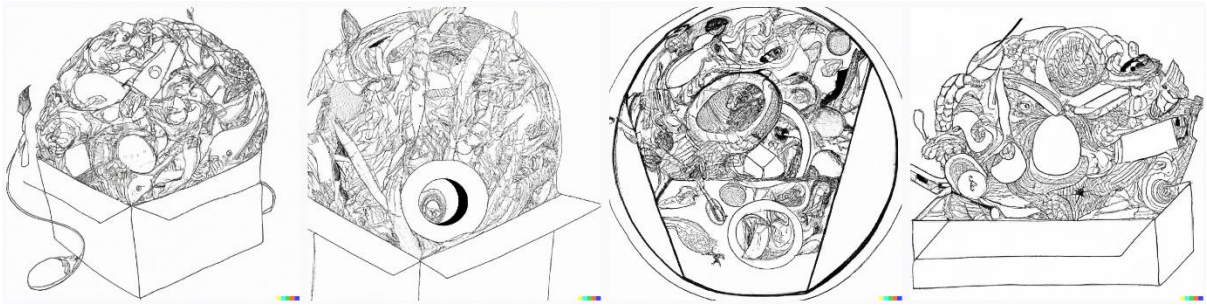
1.4 Terminology

This section provides definitions of some of the key terminology used frequently in this thesis, particularly from the philosophy of Deleuze and Guattari (1983, 1987), but also in reference to the works of other authors that have built on, applied and interpreted their ideas. This brief list is not by all means exhaustive. The concepts of Deleuze and Guattari are always multi-faceted and can acquire complex meanings in their applications. A deeper engagement can be found in Chapter 2, where these terms are applied to the context of this thesis.

Assemblage: DeleuzoGuattarian term for heterogeneous aggregates of material and immaterial elements, objects or subjects, themselves also generally assemblages. Assemblages (Figure 1-3) are characterised by *territorialisation* and *coding* as tuneable parameters that define their territorial boundaries and relationship with other assemblages and their internal structures and processes of governance and legitimisation (DeLanda, 2016; Deleuze & Guattari, 1987).

Figure 1-3

Collage of Assemblages



Note. Collage of assemblages, generated by DALL-E, Openai.com

Coding (of assemblages): DeleuzoGuattarian term for the internal forces and structures that hold assemblages together by way of explicit or implicit codes of behaviour, rules, laws (physical or social), constitutions, or empowerment and legitimisation of governance by members of the assemblage (DeLanda, 2016; Deleuze & Guattari, 1987).

Deterritorialisation: DeleuzoGuattarian term for the process of becoming disconnected from or losing a territory, virtual or actual. Deterritorialisation (Figure 1-4) generates motion and enables change. It can represent a loss but also an opportunity. Deterritorialisation enables looking beyond boundaries toward the rearrangement of ideas, associations, and constituents. For assemblages, deterritorialisation reduces the territorialisation parameter of the assemblage, enabling constituents to move more easily into and out of the assemblage. It can also refer to a change in the way the assemblage is territorialised within others (Deleuze & Guattari, 1987).

Figure 1-4

Deterritorialisations

Note. Deterritorialisations, generated by DALL-E, Openai.com

Diffraction: The term *diffraction* is used in physics to describe the behaviour of waves that encounter obstacles, narrow gaps, or gratings. The diffraction of light waves generates patterns of light and dark through which the properties of the light and those of the obstacles can be deduced. In the figurative language of Haraway (2018) and Barad (2007), diffraction is understood as an agential process that makes differences visible, deconstructs, and reveals structures otherwise unseen. Barad (2007) suggested a diffractive methodology as a material-discursive and critical practice.

Entanglement: A term from quantum physics that describes a fundamental form of connection and inseparability of objects observed in the microscopic quantum world. It is widely used by Karan Barad (2007), who literally applied the terminology of quantum physics at the human and social scales. However, in this thesis, entanglement is not used in the quantum mechanical meaning unless explicitly mentioned but metaphorically to describe relata that are deeply intertwined by classical causality, power, and politics.

Immanence (plane of): DeleuzoGuattarian term for a state of being and a vantage point of pure pre-reflexive consciousness, thought and life. A state that does not depend on or is pointing back to anything else or is dependent on a specific being or act (Deleuze, 1997). Deleuze also spoke of the *plane of immanence* or consistency as an extensive space formed by these states of being. Spindler (2010) summarised Deleuze by saying, "the plane of immanence, is formulated as the horizon out from which thinking as such can take place, and thus constitutes the internal condition of thinking" (p. 151).

Intra-action: The neologism *intra-action* has been introduced by Barad to signify a different meaning to the commonly used term *interaction*. While interaction generally assumes the pre-existence of interacting relata, Barad holds that relata do not pre-exist their relations but are evoked in the process of intra-actions as phenomena. Through the dynamism of intra-activity, phenomena are generated, and these phenomena are what is ontologically real, according to Barad (2007).

Hopium: A metaphorical substance generating false hope (Pihkala, 2022).

Line of flight: A trajectory along which an assemblage is, or could be, transformed. Lines of flight (Figure 1-5) trace and connect deterritorialisations and reterritorialisations. Lines of flight can be sought deliberately and pursued in the cause of proactive change-making. The concept relates to the paths systems take in phase space in physics. Possible or probable lines of flight form part of the environment (Deleuze & Guattari, 1987).

Figure 1-5

Thought and Lines of Flight

Note. Thought and lines of flight, generated by DALL-E, Openai.com.

Nomad: Subject pursuing a DeleuzoGuattarian nomadic way of thinking and living in a state of absolute deterritorialisation (Figure 1-6). Deleuze and Guattari also evoke the concept of nomads as *war machines* that are changemakers and promoters of social transformations (Deleuze & Guattari, 1987).

Nomadism / Nomadic: A DeleuzoGuattarian way of thinking and being that is free from the constraints of strata, structure and territory, the confines of the here and now and the need to conform to or uphold established convention. Nomadic thought (Figure 1-7) seeks the freedom found in multiplicity and flat space, the plane of immanence, the space of possibilities and becoming (Deleuze & Guattari, 1987).

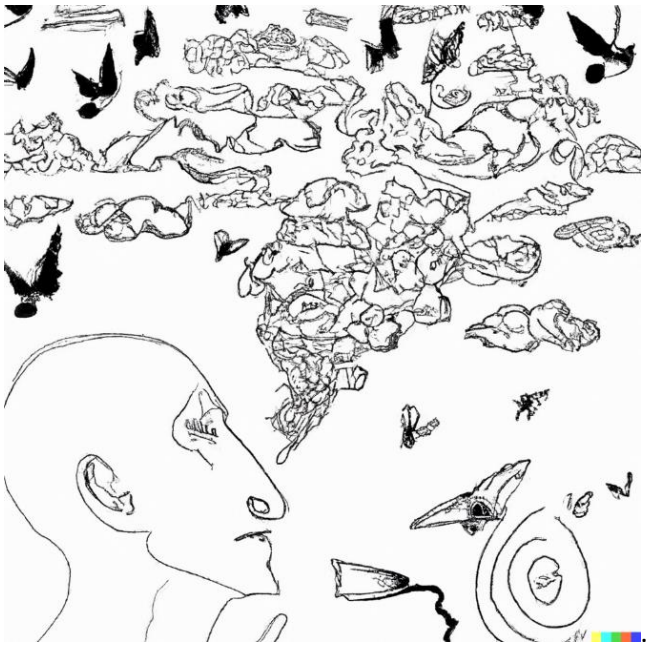
Figure 1-6

Nomads on the Plane of Immanence

Note. Nomads on the plane of immanence, generated by DALL-E, Openai.com.

Figure 1-7

Nomadic Thought

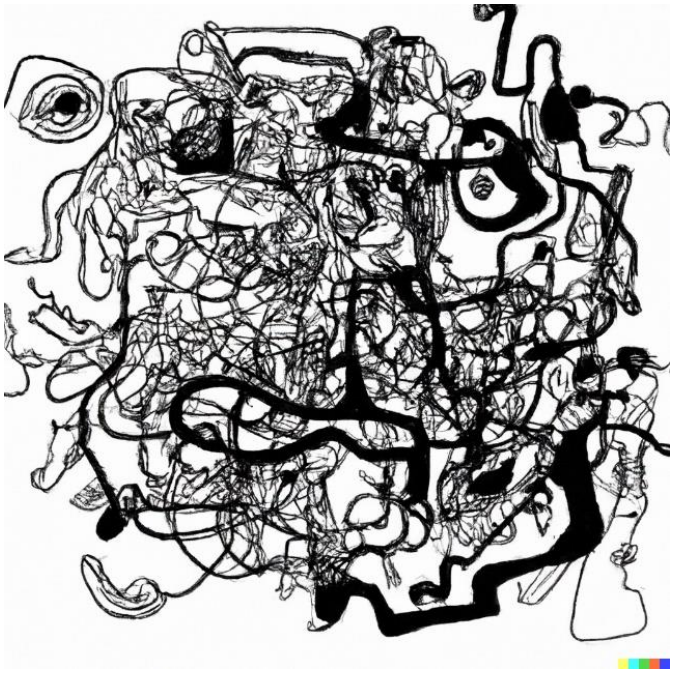


Note. Nomadic thought, image generated by DALL-E, Openai.com.

Rhizome: A multi-dimensional productive environment (Figure 1-8) of connections "between semiotic chains, organisations of power, and circumstances relative to the arts, sciences, and social struggles" (Deleuze & Guattari, 1987, p. 5).

Figure 1-8

Rhizome



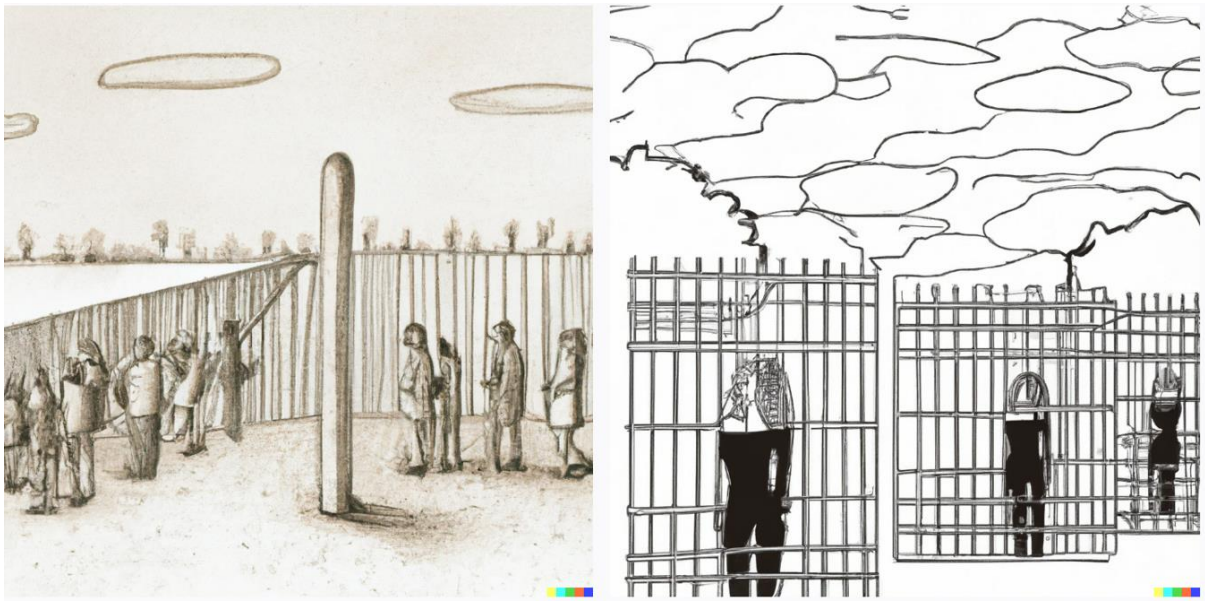
Note. Rhizome, generated by DALL-E, Openai.com

Territorialisation: DeleuzoGuattarian term for a process of becoming part of or captured by a territory (Figure 1-9), virtual or actual. For assemblages, territorialisation represents a parameter that describes the strength of delineation and segregation of the territory of the assemblage from what is outside or excluded from it (DeLanda, 2016).

Reterritorialisation: Becoming part of or captured by a new territory, virtual or actual. Reterritorialisation into a new territory is frequently an immediate consequence of deterritorialisation from another (DeLanda, 2016).

Figure 1-9

Territorialisation



Note. Territorialisation, image generated by DALL-E, Openai.com.

1.5 Premises

This study begins with the following premises:

- That our understanding of climate science is well developed, that the fundamental relationship between greenhouse gases and the climate has been understood for over a century, and that the climate emergency is indeed severe and threatens to render our planet at least partially uninhabitable within the lifespan of those born today.
- That the climate emergency is diffracting society along cultural and political fault lines, laying bare a lack of agreement within society and academia about the ontological and epistemological foundations that underpin our existence, understandings, and actions, and troubling society's relationship with the natural sciences.
- That climate change is connected to *colonisation,* and that research on climate change in Aotearoa can benefit from decolonial understanding.
- That New Materialisms are emerging as a promising philosophy for the Anthropocene and are inspiring education and qualitative research.
- That teachers are in unique circumstances during times of significant social change. They must find their identity and message in a space between *Assuagers* for the status quo and *Agents Provocateurs* towards a new paradigm.

- That the lived experience of teachers during times of significant social change, crises, or revolutions is under-researched and under-reported and that a focus on climate activist teachers can provide productive insights into the educational dimension of climate change.

1.6 Aims and Objectives

This study has the following aims:

- To explore and analyse perceptions of climate activist teachers in Aotearoa of the milieu in which they find themselves.
- To explore and analyse the desires of climate activist teachers toward education for a sustainable future.
- To inform the process of making education effective in leading society toward a sustainable future.

1.7 Research Questions

This project will explore the following research questions:

- How do Climate Activist Teachers perceive themselves, the education system, and their role as educators with respect to the climate emergency?
- What are Climate Activist Teachers' desires for changes to the education system in response to the climate emergency?

The analysis of the data gathered in this research will inform proposals for the constructive engagement of schools in Aotearoa with climate change education.

1.8 Scope

This research set out to engage with a particular demographic subset of the professional group of teachers in Aotearoa: high school teachers or educators working in teacher education who can be described as 'climate activist teachers' (CATs). The selection of this subset was deliberate for the reasons set out in the aims and to explore the research questions of this study. However, this intentional selection bias is also a limitation of this study. Further, I include myself in the group of climate activist teachers, and my perceptions and understandings are an active part of the research assemblage of this study. Therefore, this study does not represent the perceptions of teachers who

fall outside of the territorialisation of the participant assemblage of this research, such as teachers in primary or middle schools, teachers who are agnostic or in denial of climate change and its potential consequences or who remain unconvinced that society needs to change, or education needs to transform itself in response to climate change.

1.9 Significance

Mitigating and adapting to the climate emergency is arguably the most profound challenge for humanity at our present time. In a message to the United Nations Security Council, David Attenborough termed climate change "the biggest threat to security that modern humans have ever faced" (United Nations, 2021). Responding to this threat successfully will require sustained transformations of society on a broad scale and constitutes an unprecedented educational challenge. Climate Activist Teachers are sensing the profound significance of this challenge for their work. Their perceptions and desires act as important bellwethers to inform educational leadership at all levels of education management about possible pathways for adapting the education system to meet this challenge.

2 THEORETICAL FOUNDATIONS

This research centres on the perceptions and desires of climate activist high school teachers in Aotearoa. The participants of this research find themselves in a focal point of growing social diffractions on how to respond to climate change. Despite the alarming signs and overwhelming scientific evidence for anthropogenic climate change, society remains divided between those standing behind climate science and those denying or minimising it. Narratives of climate denial mix with neo-nationalist voices from the populist political right that denounce international cooperation on sustainability and "the values of a liberal, pluralistic, tolerant, and democratic society" (Baker & Quinn, 2022, p. 1). At a time when humanity would need to 'unite behind the science' (Rödder & Pavenstädt, 2023), the hegemony of neoliberal economics and competitive capitalist paradigms has contributed to an erosion of cooperation and social cohesion and, as Rizvi et al. (2022) argued, "re-cast the purposes and governance of education in human capital terms, while promoting individual self-interests in an increasingly competitive society" (p. 4).

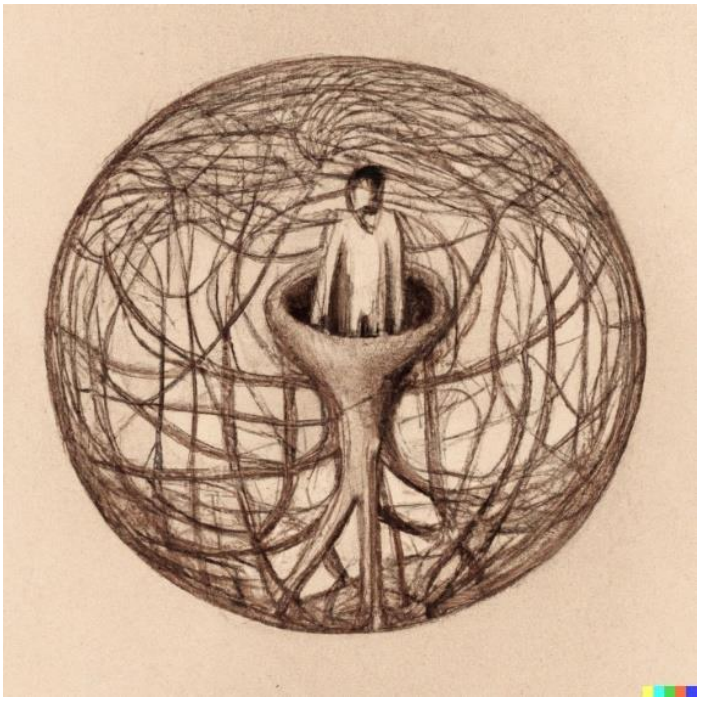
The multitude of compounding global crises during the years of this study, from accelerating and stark impacts of climate change to the Covid-19 pandemic, the spiralling biodiversity crisis, energy austerity, cost-of-living inflation, and the return of war to Europe, have led to growing uncertainty. The purpose and praxis of education are troubled, and so are the teachers tasked to navigate the landscape between neoliberal accountability paranoia, the glacial pace of national education reforms, and increasingly depressing global trajectories while being tasked to explain all this to the generation that will bear the brunt of the gathering storms. Hope, as Marginson (2022) stated, "lies, as it always does, in agency" (p. 26) and in the freedom to explore what may be possible. The desire for freedom from the territorialisations and constraints of the neoliberal education system and the desire for much greater personal agency show clearly in the narratives of the participants of this study.

Climate change is arguably the most notorious symptom of the gathering storms of the Anthropocene (Crutzen, 2010; Steffen, 2019, 2022; Steffen et al., 2018). It might, therefore, be argued that this chapter should start with a discussion of the state of the climate and the trajectories of the Anthropocene according to climate science before entering the discussion on the situation education finds itself in. However, the relationships between the Earth systems and humanity are complex and interwoven, like a rhizome, with feedback loops and connections between human thought and behaviour, social and political dynamics, laws of nature and the behaviour of Earth systems with their own rhizomatic networks and feedback loops. Rhizomes are constantly in flux, and "rhizomatics is concerned with processes over states—becoming over being" (Strom, 2017, p. 7). A feature of

rhizomes is that they do not have a centre or obvious point of entry, hierarchy, or particular path of traversal. Unlike arborescent structures, rhizomes lack specific points or positions of reference and are comprised only of “lines” (Deleuze & Guattari, 1987, p. 9). There is no outside and transcendent point of reference to the rhizome of life and existence. Life is immanent, and “absolute immanence is in itself: it is not in something, not to something; it does not depend on an object and does not belong to a subject” (Deleuze, 1997, p. 4). Rhizomes are best explored through sampling, frequent lateral movement and repeat encounters with the dynamic nodes and vertices that reveal themselves. We find ourselves not outside but already deeply embedded inside this rhizome (Figure 2-1), each of us in more or less different places, depending on individual life situations and history and the assemblages and territories we are part of.

Figure 2-1

Inside the Rhizome



Note. Inside the rhizome, generated by DALL-E, Openai.com

Therefore, the most appropriate beginning of this chapter will be to explore human thought, ontology, epistemology, metaphysics, and the mental and conceptual tools available on the journey through the rhizome as we take notes and make meaning. For education to make a stance toward climate change and the Anthropocene, a holistic appraisal of the rhizome should form part of the discourse from the outset. As mentioned in the prologue, I argue that the language and thinking of Deleuze and Guattari and the growing number of more recent works derived from their philosophy

provide a befitting frame of reference for this task. It is also a language that structures a philosophy of liberation, agency, and hope. Therefore, this is where this theoretical journey through the rhizome starts. The path through the rhizome includes "ontological detours" (Everth, 2022a, p. 11) that lead via a critique of constructivism and Barad's (2007) view of new materialism with reference to arguments from quantum physics and the engagement with Deleuze and Guattari to a pragmatic critical realist ontology. The journey terminates with a focus on the desire for greater agency by teachers and students and the hope it represents.

2.1 Deleuze and Guattari: A New Earth and New Peoples

My encounter with the philosophical ideas of Deleuze and Guattari began in a rhizomatic fashion by first discovering assemblage theory through the prolific work of Fox and Alldred (e.g., 2015a, 2015b, 2020b, 2020a) in the space of qualitative research methodologies and later in direct connection to society's grappling with climate change. My interest in assemblage theory then led to reading DeLanda (2016) and engagement with his recorded series of lectures at the European Graduate School (DeLanda, 2011). From there, my appetite grew to engage directly with Deleuze and Guattari's thinking. The more I read, the more it became apparent to me how befitting and also sign-posting the work of Deleuze and Guattari is to the critical engagement with the Anthropocene, in particular their two books *Anti-Oedipus: Capitalism and Schizophrenia* (1983) and *A thousand Plateaus: Capitalism and Schizophrenia* (1987).

Saldanha and Stark (2016) analysed the impact of Deleuze and Guattari on the dissection of the Anthropocene. They argued that "Deleuze's work presaged much of the concept of the Anthropocene, not only in his sustained challenges to humanism, anthropocentrism and capitalism but also through his interest in geology and the philosophy of time" (p. 427). The authors pointed to Deleuze and Guattari's hope to bring forth a "new earth and new peoples" (p. 437) as a prime motivation for their work. This hope drives today's gathering of energy and activism toward the engagement with climate change and the web of interlinking Anthropocene crises.

Bringing forth 'new people' is what education is supposed to do. This is the task teachers are taking upon themselves. In the current stage of human history, education is no longer a matter of transmitting culture, skills and knowledge but must focus on shaping a future society capable of preventing humanity's self-destruction. I argue that the philosophy of Deleuze and Guattari forms a befitting conceptual framework to enable teachers and the system of education to grapple with the potential for becoming the change makers humanity so desperately needs and to fulfil the obligation that this potential bestows upon all who are engaged in education.

The importance of Deleuze and Guattari's philosophy for education has been made aptly clear in the prolific output of work by David Cole (2011, 2014, 2021, 2022) over the past decade, who placed their concepts directly into the context of education in and for the Anthropocene. Cole (2021) provided a well-written introduction to Deleuze and Guattari, differentiating their individual contributions and the bibliography of their work and summarising Deleuze's aim as unhinging thought "from the prejudices, assumptions, and ways in which thought can be pinned down, controlled, and turned into a manufactured and complicit propaganda machine by dominating powers and interested parties" (p. 7). Cole portrayed Guattari as a revolutionary and radical anti-psychiatrist, "concerned with the practical and real outcomes of thought" (p. 7) that would revolutionise society. In agreement with my sentiment of the importance of Deleuze and Guattari's work in our time, Cole (2022) emphasised that

> understanding the matrix of deterritorialization, desire, climate change and learning, is perhaps the most important work that can be performed in the philosophy of education today and with respect to the future. (p. 1)

Cole (2022) argued that the ideas of Deleuze and Guattari, initially developed in the times of the post-war social liberalisation of the 1960s, are finding their "best and most relevant avenue" (p. 1) of application in society's response to the enormous and existential threats of climate change, and pointed to the centrality of Deleuze and Guattari's concept of 'desiring machines' in human psychology.

The desiring-machines in Deleuze and Guattari's work are apparatuses in the human mind that initiate and drive schizoid and paranoid processes, generate and maintain states of cognitive dissonance and motivate behaviour even if it is contradictory to the long-term wellbeing of society. The schizoid mind can simultaneously accommodate rational insights to mitigate climate change as well as the desire to maintain climate-damaging behaviour to maintain current economic constructs and benefits and the illusion of ongoing security they provide. Paranoia, triggered by visions of economic decline due to government-mandated climate action and the impacts of climate change itself, leads people to embrace hopes of economic growth instead of confronting climate change boldly.

In an online discussion I had with a beef farmer in Aotearoa, he acknowledged the need to 'solve climate change' but maintained that rural Aotearoa would be 'destroyed' if farmers were asked to reduce livestock numbers or have their emissions included in emissions pricing and trading schemes as set out in a government proposal (see MfE & MPI, 2022). He, therefore, was actively involved in

agitation in his rural community against these policies and worked towards the election of right-wing parties promising to repeal the current government's emissions policies. He is doing this despite his acknowledgement that emissions from ruminant livestock farming make up about 44% of Aotearoa's total climate emissions (MfE, 2022a). The desiring-machines in the beef farmer's mind drove him into a state of mind in which he could maintain two mutually exclusive points of view: the desire to continue with current emission-intensive business practices as well as the acknowledgment of the need to mitigate climate change, with the former winning the struggle for what he would actually do and support. Paranoid about risks to his business arising from future emissions reduction policies, he blocked engagement with the change needed to save the ecosystems from climate change's impact, thereby ultimately undermining his and future generations' long-term prospects.

The same kind of desiring-machine-induced schizophrenias and paranoias keep most of humanity hostage to dystopian planetary trajectories (Steffen et al., 2018). Cole (2021) termed the destination of this trajectory the 'black hole' of the Anthropocene singularity (see Figure 2-2), in which, through the techno-accelerations of human actions, the axis of history and time is exponentially compressed toward an extinction level event horizon "by fusing the future with the present and past" (p. IX).

Figure 2-2

Anthropocene Singularity

Note. Anthropocene singularity, generated by DALL-E, Openai.com

The application of Deleuze and Guattari's philosophy and analysis to invoke social change through education is seen by Cole (2021) as the lever to shift humanity onto an escape route away from the black hole abyss by addressing the underlying social schizophrenias:

> Yet to in any way circumvent the impact of the singularity of the Anthropocene, we need to move beyond the 'rhetoric of the ecological sublime', and address the real, deeply set, unconscious forces that have produced and are producing the Anthropocene. (p. 12)

I argue that education is obliged to engage with unpacking and addressing these 'unconscious forces' that are productive of the Anthropocene explicitly. Teaching 'climate science' is entirely insufficient in this regard. Climate change education must unpack and critically analyse the human desiring-machines and the schizophrenias that underpin our collective behaviour and inaction. As Cole (2021) acknowledged, affecting change through education is an intergenerational process that will require sustained and deliberate engagement of the education system:

> As such, the general theory behind this approach is that education provides the means to change the minds of the next generation, who will, after becoming knowledgeable, emboldened, and passionate about climate change, effect social and ecological transformations through their actions. (p. 13)

I argue that Cole's application of Deleuze and Guattari's philosophy supports Ruth Irwin's (2020) call to lift education into the "driving seat of cultural transformation" (p. 494) as a prime means to bring Deleuze and Guattari's new people about, who might lead the world to a sustainable future.

In progressing the path through the rhizome, I now introduce and discuss some of the main concepts of the DeleuzoGuattarian philosophy in the context of the Anthropocene and climate change education as an obvious next vertex to traverse.

2.1.1 Assemblages, Territories, and Immanence

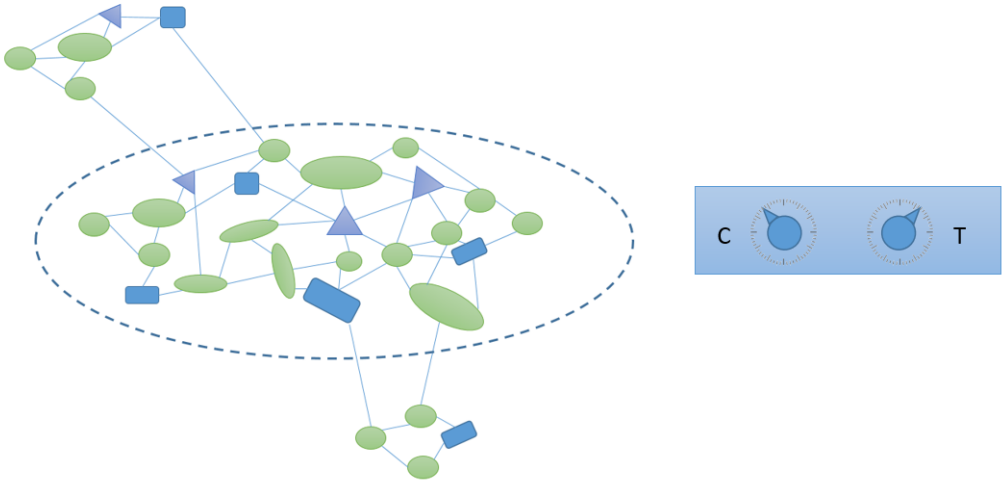
Deleuze and Guattari (1983, 1987) view reality as a turbulent space in which a multiplicity of structural forms, such as assemblages, territories, strata, planes and rhizomes, interplay. DeLanda (2016) describes this space as a morphogenetic "topological manifold" (p. 119) of virtual and actual possibilities within which structures emerge as assemblages that are shaped and constrained by this manifold but also become morphogenetic to the structure of the manifold itself. This image is similar to Einstein's theory of the curvature of space being shaped by assemblages of matter, which in turn

are constrained and directed in their motion by the curvature of the space they produced (Kennedy, 2014).

Deleuze and Guattari see assemblages as the fundamental organisational unit with the capacity to exclude and include, territorialise and govern themselves. Assemblages are heterogenous collections or bricolages of elements, which can be multiplicities of substantial and material, but also virtual, cultural, social, or technological kinds, and which are generally themselves assemblages (Figure 2-3). Territorialising behaviour and internal self-maintenance or governance are the two fundamental performative functions of assemblages. The intensities of these behaviours are parameterised into *territorialisation* and *coding* as tuneable intensive variables. DeLanda (2016) conceptualises these two parameters of assemblages as turntable knobs that can be set to different values.

Figure 2-3

Assemblage



Note. Heterogeneous assemblage with tuneable parameters for coding (C) and territorialisation (T). See also Everth and Bright (2022, p. 6).

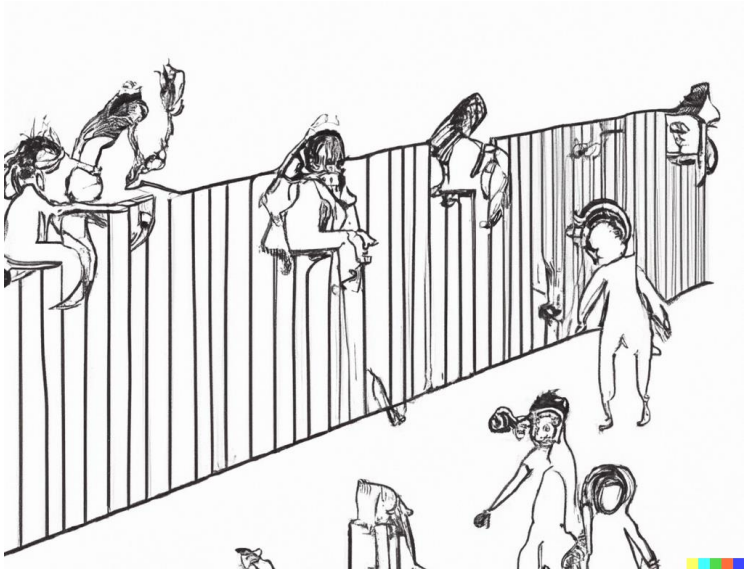
The territorialisation variable describes the intensity with which the assemblage governs its territorial borders, the way it governs the inclusion or exclusion of elements and their ability to traverse in and out of the assemblage or engage with elements beyond the assemblage. The coding variable describes the intensity of its internal governance in the form of spoken or unspoken, natural or virtual, laws, codes of behaviour, demands on compliance and conformity to norms and expectations. Coding also performs functions of legitimisation of leadership and internal constitution.

In an analysis of the hierarchical institutional landscape of education, assemblage theory provides valuable insights into the effect of territorialisation and coding on the way institutions work and often become resistant to change. In our paper on climate change and the assemblages of school leaderships (Everth & Bright, 2022), Ria Bright and I applied assemblage theory to the analysis of the reaction of school leadership to the challenges of student climate strikes. Our approach was inspired by the application of assemblage theory as an analysis tool for climate change policy development by Fox and Alldred (2020). We applied assemblage theory as a methodological and analytical framework for analysing schools and school leadership as assemblages. This led us to conceptualise the situation of teachers and students as assemblages and to consider how the dynamism of the climate emergency and the reactions of school leadership generate manifestations of deterritorialisation and re-territorialisation for the affected individuals (Everth & Bright, 2022). Fox and Alldred (2015) argued that "power resides in the affective flows between relations in assemblages" (p. 402), and they understand research itself as an assemblage that "shapes the knowledge it produces according to the particular flows of affect produced by its methodology and methods" (p. 403). As we explained, the verb 'affect' is often used as a noun in new materialist literature to analyse processes as phenomena in their own right (Everth & Bright, 2022).

The process of deterritorialisation is fundamental to Deleuze and Guattari's theory and is applied in a multiplicity of contexts and meanings (Figure 2-4). In the context of assemblages, the process of deterritorialisation can mean lowering the intensity of the territorialisation parameter, resulting in the assemblage becoming more inclusive and more permissive to the freedom of its elements to venture in and out of the assemblage. Through deterritorialisation and greater inclusiveness, assemblages can increase the scope of territory. In the context of elements of an assemblage, deterritorialisation can refer to the diminishment or loss of association of the element with the assemblage, by expulsion from the assemblage, by the dissolution of the assemblage, or by liberation from the assemblage. This loss or diminishment can turn out to be either detrimental or liberating for the element of the assemblage. Deleuze and Guattari (1987) see the deterritorialisation of elements as being most often connected with immediate reterritorialisation into a new context or assemblage, whereby "[e]ach of these becomings brings the deterritorialization of one term and the reterritorialization of the other" (p. 11).

Figure 2-4

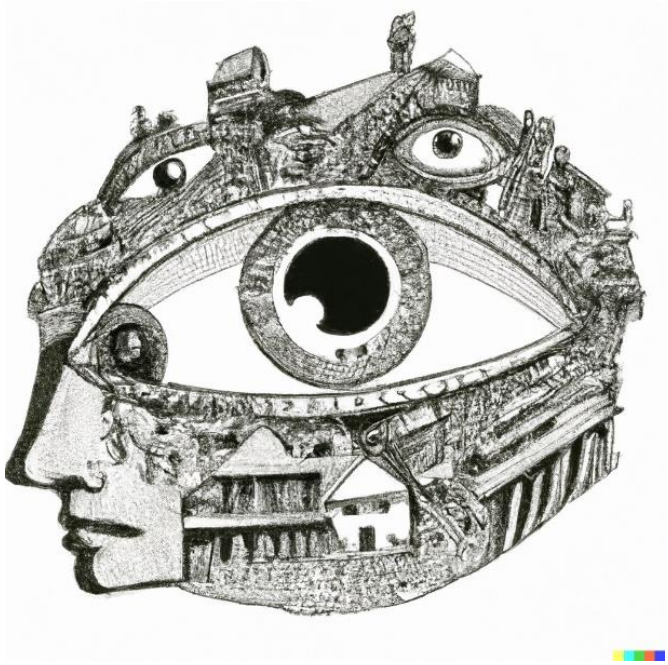
Deterritorialisations



Note. Deterritorialisations, generated by DALL-E, Openai.com.

Figure 2-5

Becoming Aware of Territorialisations



Note. Becoming Aware of Territorialisations, generated by DALL-E, Openai.com.

Territorialisation is a constant and inescapable feature of existence, and deterritorialisation remains relative to territories and strata but is not absolute. However, Deleuze and Guattari (1987) conceptualise the possibility of a state of "absolute deterritorialisation, the state of unformed matter on the plane of consistency" (p. 62), where the "acceleration of relative deterritorialisations reaches the sound barrier" (p. 62). While 'normal' deterritorialisation is a process of change and association within a system of strata and assemblages, absolute deterritorialisation is a paradigm shift akin to a phase transition in a physical environment. Striving for absolute deterritorialisation requires awareness of territorialising forces, including representations of the world and their territorialising impact on the human mind (Figure 2-5).

Solid material substances can undergo de- and reterritorialisations through changes in crystalline structures. Heating a substance to the point of melting or evaporation leads to a fundamental shift, an absolute deterritorialisation of the molecules into a different state, liberated from the connections that kept them in the territories of the solid. In the case of human existence, absolute deterritorialisation remains elusive and a process that "can only be thought or imagined, rather than achieved, for any perception of life is already an ordering or territorialisation" (Colebrook, 2020b, p. xxiii).

With respect to the Anthropocene and climate change, Cole (2022) argued that the concept of deterritorialisation "demonstrates how societies are robbed of their identities" (p. 3) and have become reterritorialised in a transcendent colonialist and capitalist system that represents the world in terms of resource to be exploited, financial gains to be made and powers to be increased. The capitalist state, Cole (2022) argued, "supplants primitive societies, and converts their immanence into transcendence through deterritorialization at every level" (p. 2). This deterritorialisation is now greatly accelerating, and climate change education becomes "an act of excavation in terms of comprehending the forces that have been buried and absolved" (Cole, 2022, p. 2). Deterritorialisations due to climate change are affecting indigenous people on a global scale (Galloway-McLean, 2017) and the task of healing humanity's relationship with the planet. Adapting to climate change may greatly benefit from a re-discovery of indigeneity, indigenous knowledge, and intercultural collaboration (Lazrus et al., 2022; Mbah et al., 2021; Mustonen et al., 2021). Galloway-McLean (2017) called indigenous people "the world's 'advance guard' of climate change" (p. 1). Education then could be seen as enacting a process of becoming indigenous again to the planet Earth and engaging with a process of "*renewing*

relatives" (Whyte, 2017, p. 158, emphasis in the original) and restoring relations with the lost indigenous heritage to the immanence of the natural world.[3]

Liberation of thought and being from oppressive territorialisation and stratification and the control and exploitation they affect is central to Deleuze and Guattari's social critique and their discussion of form and transformation. The concept of the rhizome appeals to them as an antidote:

> Let us summarize the principal characteristics of a rhizome: unlike trees or their roots, the rhizome connects any point to any other point, and its traits are not necessarily linked to traits of the same nature. (Deleuze & Guattari, 1987, p. 23)

Deleuze and Guattari (1987) described rhizomes as not being a composed multiplicity of elementary components but as constituted of a multiplicity of directions and dynamisms without end but with a centre, a "milieu" (p. 23) from which it spreads out and expands. Yet, there is no lasting escape from the divisive structures and territorialisation that can manifest within rhizomes. In this way:

> Every rhizome contains lines of segmentarity according to which it is stratified, territorialized, organized, signified, attributed, etc., as well as lines of deterritorialization down which it constantly flees. (Deleuze & Guattari, 1987, p. 10)

A key argument of Deleuze's philosophy is the rejection of transcendence and the embrace of immanence (Deleuze, 1997). Colebrook (2020b) emphasised the importance of immanence in Deleuze's philosophy and argued that transcendence has been the "key error of western thought" (p. xxiv). Daigle and McDonald (2022) argued that humanist transcendence had deterritorialised us from native immanence and reterritorialised us into a state of human exceptionalism and privilege from which we inflict the Anthropocene damages on our planet's ecosystems. Transcendence postulates the existence of a hypothetical or virtual reference position external to the material reality of life, such as a sphere of representations, virtual constructs, or divine superiority. Contrasting this, Colebrook (2020b) stated that immanence "has no outside and nothing other than itself" (p. xxiv). Healing of the Anthropocene deterritorialisations then would invoke a reconnection with Deleuze and Guattari's 'plane of immanence'.

[3] There is obviously an important discussion to be had about the definition of 'natural'. The argument might go: Humans are natural, therefore, anything humans generate including the shopping mall and transcendent humanist perspectives are natural, and so forth. Unpacking this argument sufficiently would exceed the scope of this thesis. For now, the common view of 'natural' is assumed to mean here the way the world would be without human technological civilisation and globalisation.

> In any case, there is a pure plane of immanence, univocality, composition, upon which everything is given, upon which unformed elements and materials dance that are distinguished from one another only by their speed and that enter into this or that individuated assemblage depending on their connections, their relations of movement. A fixed plane of life upon which everything stirs, slows down or accelerates. (Deleuze & Guattari, 1987, p. 255).

Reconnecting with this plane of immanence leads via nomadology to posthumanist visions.

2.1.2 Absolute Deterritorialisation and Nomadology

Becoming aware of territorialisations that capture and control minds and mitigate genuine engagement with what is immanent and thereby possible leads to a growing desire to break free from the mechanisms of territorialisation as such, where and when this is possible, leads to absolute deterritorialisation. Once no longer bound by or belonging to territories, the mind becomes deterritorialised in an absolute sense and becomes 'nomadic' or stateless. Deleuze and Guattari (1987) proposed a state of 'nomadic' existence as the endpoint of absolute deterritorialisation where nomads exist and move in a 'smooth space' that is neither limited nor limiting and rejects pressures of territorialisation. Absolute deterritorialisation becomes the 'territory' of the nomad:

> It is in this sense that nomads have no points, paths, or land, even though they do by all appearances. If the nomad can be called the Deterritorialized par excellence, it is precisely because there is no reterritorialization afterward as with the migrant, or upon something else as with the sedentary. (p. 421)

Deleuze and Guattari (1987) argued that in contrast to the nomad, the sedentary is connected to property and embedded in states and their apparatuses, while the nomad's relationship to the Earth is defined by deterritorialisation. The nomad "reterritorializes on deterritorialization itself" (p. 421). Deleuze and Guattari's (1987) nomads perceive themselves as embedded in and embodied and coming from the plane of consistency or plane of immanence. Freedom of thought from confinement into territorialising domains is characteristic of the nomadology concept:

> 'Nomad thought' does not immure itself in the edifice of an ordered interiority; it moves freely in an element of exteriority. It does not repose on identity; it rides difference. It does not respect the artificial division between the three domains of representation, subject, concept, and being; it replaces restrictive analogy with a conductivity that knows no bounds. (p. 13)

The concept of nomadic thinking links deeply to the concern of education and this thesis. For humanity to extract itself from the ultimately suicidal trajectories of planet-destroying resource exploitation and the growth-predicated capitalist economic paradigm, a deterritorialisation from assumed but impossible futures and the praxis that still points toward the Anthropocene abyss will be required. Thinking *differently* is a prerequisite to, firstly, recognise the predicament and, secondly, find pathways through a 'great global reset' (S. Roth, 2021)[4]. Learning to think differently is arguably the most obvious requirement to make progress. Sellers and Gough (2010) explored how thinking with Deleuze opens pathways for education to think differently in an essay in which they take turns. In his contribution to their cooperation, Gough (2010) expresses how what he calls 'nomadic subjectivity' enables overcoming sedentary and territorialised thinking to envision curriculum and education differently:

> I found Deleuze and Guattari's (1987, 23) distinction between the 'sedentary point of view' that characterises much western philosophy, history and science, and a 'nomadic subjectivity' that allows thought to move across conventional categories and move against 'settled' concepts and theories, to be a clear incitement to 'push propositions and suppositions beyond their limits'. These concepts invite us to see the ordinary extra-ordinarily and to see-think-write-picture differently. (p. 598)

Nomadic philosophy was regarded by Braidotti (2012) as "the discursive practice with the highest degree of affinity to the mobility of intelligence: it is both physical, material, and yet speculative and ethereal" (p. 2). Philosophical thought, as Braidotti (2012) argued, "is structurally nomadic" (p. 2), anti-Cartesian and non-dualistic, and affirms the new materialist view of the material embodiment of the mind in the flesh. Braidotti (2012) went further and affirmed the view that consciousness is not reducible to human thought but "nomadic thought invests all that lives, even inorganic matter, with the power of consciousness in the sense of self-affection" (p. 2). Breaking out of Cartesian territorialisations, nomadic thinking leads to a process of self-reinvention and "qualitative transformation" (Braidotti, 2013, p. 345). Being politically engaged and ethically accountable is a central tenet for Braidotti's (2013) take on nomadology and corresponds to her emphasis on ethics of the affirmation of potentiality and becoming. Becoming nomadic, as Braidotti (2013) argued, is anti-essentialist, transpersonal and "ultimately collective" (p. 346). Starting at the centre of the self, Braidotti stated that nomadology is a process of "critique of the centre from the centre" (p. 348) in

[4] The concept of the 'Great Reset' was championed by the World Economic Forum (WEF) in the aftermath of the 2020 Covid epidemic. It has also been used as a paradigm for the task ahead to lead humanity out of the Anthropocene predicament.

which the nomadic subject is both “self-propelling and hetero-defined, that is to say, outward-bound” (p. 348).

Contrary to understanding education as a process of cultural territorialisation into norms and bodies of static knowledge, nomadism corresponds to the concept of education as an experiential and experimental discovery and “inquiry into the as yet unknown” (Semetsky, 2009, p. 451). As a key ingredient of overcoming educational dualisms, nomadology enables the “power to think through problems to their deepest philosophical levels” (Cole, 2014, p. 80). Nomadic thinking and nomadic praxis are important elements of change-making. Deleuze frequently uses the term ‘machine’ to characterise assemblages that function as operators on others and affect change through their actions. Due to the importance of nomadism for change-making, Deleuze and Guattari (1987) coined the term *Nomad War Machine* to characterise nomadic thinkers and change-makers and the processes of invoking change they are capable of. This term is discussed in detail below due to its relevance to how climate activist teachers and educators in and for the Anthropocene may be able to see themselves. I argue that a deterritorialisation of the rigid assemblages that structure the educational landscape and the evocation of nomadic thinking are key steps toward education for and in the Anthropocene. In our paper (Everth & Bright, 2022), we concluded that “deliberate deterritorialising and decoding actions by school leaderships” (p. 20) can promote the “transition of schools into the reality of the climate emergency” (p. 20). The analysis and discussion of the findings of this research frequently refer to assemblage theory and indicate that climate activist teachers are on a path toward becoming prototypical nomad war machines and change makers.

2.1.3 Schizoanalysis of Education

Central to causing and potentially solving the Anthropocene predicaments is the human mind and the interplay of desire with the complexity of natural and social ecology. Deleuze and Guattari’s work on Schizoanalysis of society in light of the liberation struggles of the 1960s and 1970s is directly transferable to a psychoanalysis of society at the edge of the 21st-century abyss (Dodds, 2011) and has significant relevance to education.

In their book *Anti-Oedipus: Capitalism and schizophrenia* (Deleuze & Guattari, 1983), the authors discussed the condition of society as playing out between two polar opposites, the despotic machines of police-state apparatuses and the dictatorial “Urstaat that the people would like to resuscitate” (p. 266), and the desire among the people for freedom from all oppression, that leads toward nomadic absolute deterritorialisation. Deleuze and Guattari (1983) said about the people:

> [t]hey are torn in two directions: archaism and futurism, neoarchaism and ex-futurism, paranoia and schizophrenia. They vacillate between two poles: the paranoiac despotic sign, the sign-signifier of the despot that they try to revive as a unit of code; and the sign-figure of the schizo as a unit of decoded flux, a schiz, a point-sign or flow-break. They try to hold on to the one, but they pour or flow out through the other. They are continually behind or ahead of themselves. (p. 260).

Transposed into the context of today's vortex of anthropogenic challenges, the paranoiac path leads to a reterritorialisation of society into reactionary neo-fascism and strong-man phantasies played to by the populist right-wing desire for power. In contrast, the schizophrenic alternative leads to escape through deterritorialisation, individual agency and revolutionary potential. For Deleuze and Guattari, paranoia and schizophrenia are products of capitalist hegemony. Holland (1999) stated that "[c]apitalism fosters schizophrenia, in brief, because the quantitative calculations of the market replace meaning and belief-systems as the foundation of society" (p. 2).

The concept of paranoia is perhaps more readily understood as a consequence of trying to impose order and control onto a world full of frightening perspectives. Understanding what Deleuze and Guattari meant by schizophrenia requires some further explanation. Van der Wielen (2018), in her application of Deleuze and Guattari's philosophy to the clinical context of nursing, offered some helpful interpretations. The author argued that the schizophrenic experiences the world intensely and without the territorialising filters of the 'sensible'. The intensity and directness of the engagement of the schizophrenic with the world mean that they live "in the midst of affects that are not canalized and regulated by social codifications" (Van der Wielen, 2018, p. 5). The *schizo* or *shiz,* as Deleuze and Guattari (1983) said, escapes the codifying and territorialising forces of capitalism that are "constantly arresting the schizophrenic process and transforming the subject of the process into a confined clinical entity" (p. 245). The schizo emerges in Deleuze and Guattari's writing as a saviour and liberator of society from the fatal attractors of neo-fascism and paranoia. Wandering the world in a nomadic stance as a revolutionary and radical who resists oppressive territorialisation, the schizo becomes capitalism's "exterminating angel" (Deleuze & Guattari, 1983, p. 35).

Neoliberal education, with its focus on paranoia-inducing accountability, grading of students, and standardisation of curricula and assessments, works to suppress schizo drifts from teachers and students. Neoliberalism quells revolutionary spirits and attempts to corral nomadic thinkers back into territorialisation by administrations, external reviews, performance assessments and qualification labels. This keeps education systems hostage to a praxis of cultural reproduction, including the inculturation of students into society's climate-destroying habits. As Cole (2022) pointed out,

education lacks the courage to speak to the root causes of climate change and avoids the socio-psychological analysis of the capitalist system. Cole (2022) suggested undertaking a schizoanalysis of education for the Anthropocene and laments the refusal of education to address the territorialising machine of capitalism explicitly:

> [T]he fundamental problem with environmental education, education for sustainable development, and the application of the Sustainable Development Goals, is precisely that, in the main, they do not take into account deterritorialization, desiring-machines, and their effects in and as capitalism. In Anti-Oedipus, the method that Deleuze/Guattari suggest that deals with deterritorialization, desiring-machines, and capitalism is called 'schizoanalysis'. (p. 4)

As Cole (2022) argued, a Schizoanalysis of education should unlock the potential for effective change-making through a deep understanding of Deleuze and Guattari's concepts of capitalist desiring-machines and the possibilities of deterritorialisation. It should unleash teachers as nomad-war machines and change-makers and unsettle the paranoid neoliberal structures that hold education hostage to the destructive capitalist desiring machines. A deeper analysis of the concept of teachers as Deleuze and Guattari's nomad war machines follows later in this section.

2.2 Ontology and the (Re)Turn to Matter

> I would like to return to the question of the real, the question of ontology, the question that the privileging of subjectivity and representation has tended to foreclose. It is on the relations between matter and life that I want to focus here, the conditions and qualities required for the opening up of matter to the emergence of life. (Grosz, 2011b, p. 17)

After introducing the concepts of Deleuze and Guattari in the previous section, the next segway on the path through the rhizome leads to interrogating the relationship of humans with the material world and the ontological premises that shape the discourse of this relationship. Educators have a special responsibility as arbiters between reality, ontology and epistemology. However, over the last decades, teacher education has foregrounded epistemology while relativising and sidestepping ontology. The normative demands of the climate-altered reality and the status of diffraction within society along epistemological and socio-political fault lines have revealed a lack of ontological discourse and consensus. There is ground to be covered. Ontology should form a foundation on which a productive discourse about humanity's relationship with our planet can be built. Latour (2017) saw the need to engage with ontology and argued that living in the Anthropocene would force us to

confront fundamental questions on who we wish to become and "with what cosmology" (p. 143). For education, a firm grounding in ontology should be of particular concern. Learning, as Brown (2009) argued, should emerge from a critical-realist engagement with ontology. In their pledge for the development of a social ontology for science education, Bazzul and Kayumova (2016) turned to Deleuze and Guattari and argued that the "philosophy of rhizomes and assemblages allows educators to merge critical, post-foundational perspectives with questions of ontology" (p. 285).

The turn to ontology is not limited to an ontology of physical existence but must also encompass an "ontology of being" (B. Martin, 2016, p. 425) that leads to justice and responsibility in light of the climate crisis. Concerning the embodiment of climate change education undertaken from a position of deep immersion into ontology, the work of Verlie (2017, 2019; Verlie & CCR 15, 2018) has been inspirational from the beginning of this research and encouraged me to take my engagement with 'unfinished business' in ontology within education seriously. However, the turn to ontology is not necessarily unifying. From epistemological indeterminism and a plethora of ways of *knowing*, representing and speaking, we find ourselves debating a philosophy of 'many ways of *being'* and a philosophy embracing a multiplicity of realities that are said by Barad (2007) to be emergent only fleetingly as phenomena in specific intra-actions. The significant popularity of Barad's (2007) work points to a strong demand for engagement with ontology and also a continued embrace of indeterminism as a popular paradigm within the ontological turn. The latter is problematic when it comes to engaging with the climate emergency and its deterministic physical causes and projections. Philosophical discourse, paraphrasing MacLure (2017), will not discipline the greenhouse effect or its consequences. Only hands and feet can accomplish a modification of the flows of matter that are generative of climate change. To motivate the actions of hands and feet, especially through education, a pragmatic realist approach is in my mind important now. This chapter intends to point this way.

One can argue that climate change and the Anthropocene predicaments are a direct consequence of fundamental failures of the transcendental humanist philosophy that shaped the course of the past century and the relationship of humans with the more-than-human world. Healing this relationship will, therefore, require a critical appraisal of ontological positions. This is especially important to education at a time when the human relationship with nature moves to the centre of attention. Zembylas (2017) provided a well-developed overview of the response to the ontological turn in education, emphasising the need for ontological clarity. However, as Zembylas acknowledges, providing such clarity is challenging due to the plurality of views that have evolved in the ontological turn in the social sciences and humanities. While the material world around us is rapidly changing to our detriment due to humanity's actions, the multiplicity of ontological perspectives remains diffractive for the political process of change-making and education. Despite this multiplicity, and in

paraphrasing and extending Zembylas (2017), the following key themes of the ontological turn emerge:

- Acknowledgement of the existence and the agency of a vibrant world of matter beyond and independent of human consciousness and representations.
- Rejection of representationalism, i.e., rejection of the idea that representations are passive products of discourse that can be treated independently from the objects they refer to.
- Decentring of the human and adoption of post-humanist perspectives.
- Recognition of relationality and difference as foundational to ontology.
- Embracing the political implications and obligations of ontologies.

If education aims to assume the driving seat of cultural transformation (Irwin, 2020), ontological grounding will be essential in order to speak truth to power confidently and to educate the next generation to become response-able (Murris & Bozalek, 2019) people in this world. So here I will retrace my personal trajectory of questioning ontological perspectives, those that centrally affected society's climate change struggle over the past, and those that proclaim to lead the way forward.

I grew up with a deep-rooted quest of wanting to know what this world is, who I am, and how society justifies its actions. My ontological wondering began as a student, reading German philosophy, Kant, Nietzsche, and Heidegger, and continued with a master's degree in physics and engagement in the discourse on the metaphysics of relativity theory and quantum mechanics. During this time, I developed a stance as a pragmatic realist, convinced that humans are ultimately an insignificant grain of sand in an immense universe full of diverse emergent phenomena, objects and other subjects. This insignificance of humans in the wider context of the cosmos informs a perspective in which humans are naturally decentred. In this perspective, human consciousness and its observations are generative of representations but not of reality itself. From this perspective, human theorising develops a succession of more and more refined representations of the world, allowing us to communicate observations and theoretical discourse, derive explanations and predictions of phenomena, and purposefully manipulate reality for desired outcomes. This ontological position is reasonably well described by Hoefer's (2020) *tautological scientific realism* (TSR). However, when it comes to understanding and affecting human desire and reasoning, TSR is insufficient, and attention then turns to representations as virtual but ontologically real elements of the human assemblage. The ontological discourse then pivots toward the politics of power, domination, and economics that shape human behaviour and affect the processes that construct representations and channel their agency. Politics and power became the focus of the turn of philosophy to constructivism and deconstruction over the last decades of the 20th century and, in its extreme, led to the radical constructivism of Peschel and

Riegler (1999), who asked if representation even requires there to be an external reality at all, and the post-modern science of Funtowicz and Ravetz (1993), who argued that 'facts' lost their importance and the political discourse determines what reality is in a time of 'post-normal science'.

The constructivist narrative and the critique of scientific realism were influential when I enrolled in teacher education in 2010. I saw this reflected in the fact that science is anchored in the New Zealand Curriculum (2007) as just "*a* way [among others] of investigating, understanding, and explaining our natural, physical world and the wider universe" (p. 28, emphasis added). As a beginning teacher of physics, mathematics and science, this ambiguous statement hinted at a bow toward constructivist paradigms and a questioning of the role of science as the arbiter between a real and material world and the human sphere. Humans are predicated by matter with every breath we take, and the ontological ambiguity of radical constructivism over reality beyond the human mind seemed unsatisfactory at best.

Constructivist theories, relativism and the rejection of realism seem at first sight to align with the inclusion of a plurality of views, including indigenous philosophies such as mātauranga Māori in educational contexts. However, in recent scholarship (Hikuroa, 2017; Kingsbury, 2022; Rosiek et al., 2020; Whyte, 2021; Wildcat, 2009), indigenous philosophies are recognised for their realist foundations, emphasis on relationships and responsibilities, parallels to scientific modes of inquiry, and affinity to the ideas of a new materialist turn in ontology. Therefore, a critique of the ontological relativism in constructivist paradigms is nuanced by emphasising that accepting a vibrant and agential reality outside of the human is a common thread between this critique and the acknowledgement of indigenous worldviews.

Many years before embarking on this thesis, my sensitised stance toward the then yet undeclared climate emergency, the conflict between constructivist ideology, in particular in education, and the evolving crisis arising from the domain of matter grabbed my attention and energised, years later, my re-engagement with academia as a PhD candidate and researcher. The radical constructivist turn proved problematic at a crucial time when climate change presented a normative challenge to the constructivist paradigms (Calder, 2011). As Hansson's (2020) extensive review revealed, climate science became "a popular target among academic epistemic relativists" (p. 1), who, according to Hansson (2020), argued that claims by climate scientists should be treated as social constructions and not as "reports on the actual state of the natural world" (p. 1). Science described the dangers of carbon emissions to the climate and issued ever-louder warnings during the last decades of the 20th century.[5] However, society did not react proportionally to the threat, and

[5] An overview of climate science and a brief trace of the developments of the field is provided in the next section.

political and economic interests developed a counter-narrative that denied the findings of climate scientists and their implications. This counter-narrative was enabled, supported, and prolonged by the chasm between the natural and social sciences in academia, as Hansson (2020) analysed. Constructivism set the social sciences up for a conflict with the natural sciences over ontologies and the right to "speak truth to power" (Demeritt, 2006, p. 456) at a time when academic unity would have been needed to confront humanity's self-made existential crisis and the forces that were amplifying it.

Sharov and Tønnessen (2021) cited Uexküll's three-level structure of 'Innenwelt' [inner world], 'Umwelt' [subjective representation of the environment], and 'Umgebug' [reality, the actual environment'], and argued that the interactions in from of semiotic and physical forces between these levels shape the trajectory from the past via the present to the future (p. 318). Citing Hoffmeyer (2007), the authors argued that change in the environment is brought about through "semiotic causation" (p. 318) at the interface between the Umgebung and the Umwelt, representation and reality. Therefore, a firm ontological commitment and clarity about the relationship between reality, representation, and the self would seem essential for anybody wishing to be an effective change maker and agent confronting the anthropogenic challenges of our time. For teachers, this ontological grounding is crucial, as they not only need to guide their own actions but must enable agential capacity in the next generation based on a secure foundation from which they can speak truth to power (Demeritt, 2006).

Developing a pragmatic ontology that can bridge the chasm between the natural and social sciences seems essential now to navigate the challenges ahead. For education in the time of the Anthropocene predicaments, the onto-epistemological clarity that Zembylas (2017) called for would seem of central importance. How can we argue for fundamental social change, driven by a transformed education, if there remains uncertainty over the onto/epistemological understanding of the problem? Therefore, I found it necessary to undertake a significant 'ontological detour' (Everth, 2022a; Everth & Gurney, 2022) in preparation for this research and the engagement with climate activist teachers. This ontological journey traversed constructivism and new materialism and ultimately returned to a pragmatic critical realist position. Places along this path are retraced in the following sections.

2.2.1 An Overview of New Materialist Philosophies

New Materialist philosophies redirect attention to *matter* and its agency as the foundation of existence and seem to offer a productive theoretical approach for the Anthropocene. Coole and Frost (2010) (and I am aware of the rather improbable juxtaposition of the authors' names with the topic of

global warming!) provide a comprehensive collection of essays by authors of the emerging and diverse new materialist field and provide multiple entry points for critical evaluation. In the introduction, Coole and Frost (2010) stated the situation of our existence concisely, as emergent from and embedded in the material world on which we depend for every breath we take: "how could we be anything other than materialist? How could we ignore the power of matter and the ways it materializes in our ordinary experiences, or fail to acknowledge the primacy of matter in our theories?" (p. 1). The authors pointed out that constructivist philosophy has led us away from the centrality of matter and into the space of mind in which "a host of immaterial things seems to emerge: language, consciousness, subjectivity, agency, mind, soul; also imagination, emotions, values, meaning, and so on" (p. 2). Concerning the last three decades of postmodern theories and radical constructivist philosophy, Coole and Frost observe that philosophers have "radicalized the way they understand subjectivity, discovering its efficacy in constructing even the most apparently natural phenomena" (p. 2) and claim that "It is now time to subject objectivity and material reality to a similarly radical reappraisal" (p .2).

New materialist philosophy stands in contrast to Plato's cave allegory of human existence, cited by Riegler and Peschl (1999) in their attempt to justify Radical Constructivism's central hypothesis of the isolation of the human mind from reality and their attempt to refute the ideas of other than self-referential representations. Plato's cave allegory suggested human existence was comparable to people locked in a cave facing away from the opening and only perceiving shadows of objects passing in front of a fire projected onto the wall in front of them but never seeing reality outside the cave. Plato's cave allegory is based on the implicit premise of the Cartesian cut between the human mind and some observable reality beyond (Atmanspacher, 1997). This cut creates the *observer* versus *observed* dichotomy through which Radical Constructivism negates the relevance of the *res externa* [external world] in favour of a self-referential model of mind and existence. The experienced "Wirklicheit" [reality] no longer has any direct dependency on a reality outside of the mind, and the res-externa is relegated merely to "perturbations" of internal states (Peschl & Riegler, 1999, p. 10). New materialist theorists argue that this implicit Cartesian cut is imaginary and aim to reunite the mind with the world of matter in which it is imbricated. New materialism, as Cole and Frost (2010) argued, is "post- rather than anti-Cartesian" (p. 8)

Below, I briefly summarise some of the key ideas of the opening section of the contributing essays in Coole and Frost (2010) insofar as they have relevance to this research project and offer perspectives to be explored in the quest for ontological foundations from which to argue the case for climate action and authentic educational narratives.

New materialist philosophy understands matter as having agency of its own and being able to generate life and, ultimately, the human mind, absent of a God or spiritual forces (Bennett, 2010, pp. 63, 64). These are vitalist ideas and imply a monist ontological premise. The mind is seen as an emergent property of matter and not superior to it. And, expanding on the consequences of imagining materiality as lively and self-transformative, Coole (2010) observed that in the Western social sciences, matter is mostly viewed as "essentially passive stuff, set in motion by human agents" but without its own agency or meaning" (p. 92). Coole then asked, drawing on Merleau-Ponty, if it is possible to imagine otherwise: "a lively materiality that is self-transformative and already saturated with the agentic capacities and existential significance that are typically located in a separate, ideal, and subjectivist, realm" (p. 92).

Expanding further on these questions and the new materialist premise of agential materiality, Orlie (2010) developed a take on impersonal materialism based on Nietzsche. Orlie suggested that subjective experiences of humans, judgement and creative, critical mentality are not produced from some superior and other-than-material essence but arise naturally from matter in a "post-Darwinian" (p. 117) manner. Orlie argued that the ego that Nietzsche and Freud explored, and its unwillingness to accept its dependence on the material, promotes sovereign fantasies. Orlie spoke of the "vicissitude" (p. 132) of alienation from all of nature caused by the rise of the sovereign fantasies of the ego and the loss of union. I argue that these sovereign fantasies lie at the heart of humanity's nature and climate-destroying ignorance.

Consequentially, new materialist philosophy challenges our concepts of freedom, the autonomy of decision-making, sovereignty and responsibility, which Cheah (2010) unpacks by counterposing "the materialisms of Derrida and Deleuze with that of Marx" (p. 70). Paraphrasing Cheah's discussion of Derrida, materiality, through its constitutive exposure of the subject to the other, challenges the freedom of the rational subject for conscious and responsible decisions and is thought as the undoing of the power of the subject and the undoing of sovereign politics.

Besides the frequently cited collection of essays on new materialism by Coole and Frost (2010), the book edited by Ellenzweig and Zammito (2017) on the politics of new materialism stands out. Within this book, the chapter on *Deleuze and New Materialism* by Ansell-Pearson (2017) is of particular interest. Ansell-Person built on Elisabeth Grosz (2011a, 2011b) and her reading of Deleuze and Guattari and showed why DeleuzoGuattarian concepts are important for new materialism and how the contribution of Deleuze and Guattari provided a complex tapestry of thought for current new materialist work (Roffe & Stark, 2015). As Ansell-Pearson (2017) pointed out, Deleuze and Guattari, while rejecting anthropocentrism and human exceptionalism, remain focussed on the "normative and

existential implications of human *becomings*" (p. 88, emphasis added). As Ansell-Person argued, there is no room for any exceptionalism or innate privilege of existence in Deleuze and Guattari's philosophy, while at the same time centring on the relationship between humans and non-humans.

Deleuze and Guattari aimed to dissolve the boundaries of the subject and unite it with the matter it emerges from. The rejection of an "essential, unified, singular, humanist subject" (Ringrose et al., 2019, p. 11) is a uniting theme of new materialist and Deleuze and Guattari's philosophy, in which the subject becomes a "momentary juncture point through which material, discursive and affective forces meet and flow" (Ringrose et al., 2019, p. 11). In Deleuze and Guattari's materialism, matter, life forms, consciousness, and virtual concepts grasped by the mind are equally real, and ideas, passions, and desires are immanent in the material reality itself. The position of Deleuze and Guattari, as Ansell-Pearson (2017) stated, "seeks to contest the primacy accorded to the human in our theoretical discourses and then utilize this for the ends of a post-humanist position" (p. 90). Deleuze and Guattari, as Ansell-Pearson recognised, are ethically motivated to "liberate human beings from the realm of myth: the myths of religion, of a false physics, and of a false philosophy" (p. 92), which is an educational project and requires an "ethical pedagogy of the human being" (p. 92). Bringing about Deleuze and Guattari's vision of a new earth and its new people is an educational project, and it is obvious that the new materialist turn should affect educational theorising and praxis.

2.2.2 New Materialisms in Education

The new materialist turn has informed educational theorising in general and gives theoretical backing to a resurgence of emphasis on place and outdoor-based education concepts in environmental and sustainability education. Applying new materialist thinking and Deleuze and Guattari's concepts of the matter/discursive assemblages to the context of environmental and sustainability education, Mannion (2019) emphasised the relational connection between the social and the material world and the "expressive capacities to affect and be affected by each other" (p. 1353) that new materialist assemblage thinking reveals. New materialisms combined with Deleuze and Guattari's concepts become a productive lens for rethinking pedagogy from a posthumanist perspective. Mannion (2019) followed the growing critique of humanist philosophy and pointed to the need for a de-centring of humans and "countering of human exceptionalism" (p. 1354). The author argued for a need to re-think the 'environmental stewardship' concept, which is rooted in an anthropocentric attitude of human exceptionalism and suggested human superiority thinking must be replaced with a focus on the interrelations between humans and the more-than-human world. New materialist education aims to disrupt human exceptionalism and emphasise human-nature relationships, and, as Mannion (2019) stated, "to create conditions of affective encounter for learners" (p. 1366) with the more-than-human

world. Such pedagogy disrupts traditional assemblages that centre on human needs and replaces them with assemblages in which the more-than-human world has equal footing.

The collection of essays on new materialism in the context of education edited by Ringrose et al. (2019) provides a rich set of perspectives on the potential of new materialist ideas to reconnect education with the world of matter. I cite below some of the contributions of this collection with reference to their original publications.

In an interesting discourse on the way *voice* is conceptualised in new materialist educational enquiry, Mazzei and Jackson (2017) argued that voice is always bound to an "agentic assemblage" (p. 1090) in the Deleuze and Guattarian sense, where the discursive and the material are united. In this agential assemblage, voice no longer belongs to the speaking subject alone but is recognised as being entangled with the elements of a complex communication assemblage of speakers, listeners, and the material constitution of the environment. The act of speaking evokes the dynamics of this assemblage, its power dynamics, resonances, echoes, and virtual immanent potentialities, and becomes an "a doing" (p. 1095). Mazzei and Jackson's discourse has implications for educational praxis and research and will be useful for reference within the reflexive perspective of this research.

From a new materialist perspective, diffractive pedagogies across a spectrum of imaginations deepen learning processes through conscious consideration of the materiality of the education assemblage of bodies, artefacts, and creative potentials. Hickey-Moody et al. (2016) see new materialism as providing "a methodology, a theoretical framework and a political positioning" (p. 220) for the exploration of the "co-constitution of matter and subjectivity" (p. 220). The authors argued that matter is teaching us because, as MacLure (2017) said, it is not disciplined by human discourse and thereby "shows us the limits of the world as we know it, and prompts us to shift these limits" (Hickey-Moody et al., 2016, p. 220). While the authors in their paper focused on applying their thinking to teaching dance, their ideas link with a current turn to place-based and outdoor-based education that brings students and teachers directly into an immersive contact with nature outside of the sphere of human construction.

The connection of new materialism to outdoor and environmental education has been explored extensively by Mcphie and Clark (2015), who argued that the new materialist turn is of "particular significance to environmental education as a ready paradigm that decolonializes, dehierarchicalizes, and deterritorializes essentialist conceptions of the human relationship to the environment" (p. 230). The authors pointed to a common praxis of focussing on a *perceived disconnection* of humans from nature, which then seems to require a remedial *reconnection* through

specific educational interventions. However, new materialism-based environmental education's goal should be the realisation that this connection is and always will be pervasive and inescapable. And as the authors state, teaching from a narrative of a pointillist dis/reconnect with nature risks reinforcing the perceptions of Cartesian binary cuts between subject/object and mind/matter. If something needs to be re-connected, then it is already apart and separable in principle. New materialism, as Mcphie and Clark (2015) emphasised, offers a paradigm shift that "counters these ontologies and offers a new direction for thought" (p. 231).

Concerning the Anthropocene predicaments of our time, Mcphie and Clark (2015) suggested that this paradigm shift can inform sustainability education for securing the planet's future. The authors then led the reader through a hypothetical walk in the park, showcasing their approach. In their conclusion, the authors are critical of prevailing objectivist educational approaches, which, as they argued, reinforce "without questioning inherent assumptions and biases" (p. 245) an ontology of separate essences and transcendent, objective, and eternal forms. If we wish to end the "pressing extinction event we are perpetuating" (p. 246), as the authors stated, we need to overcome the "moralistic calls to care for 'the' environment" (p. 246) and replace it with a relational pedagogy that emphasizes the inseparability of the human/environment assemblage through a metaphysics of immanence. This is the metaphysics Deleuze and Guattari present.

2.2.3 Critique of Barad's Agential Relativism

Karen Barad's widely cited book *Meeting the Universe Halfway* (2007) has become foundational to the new materialism field and garnered over 20,000 citations on Google Scholar by the time of this writing. Due to the importance of Barad's work within the new materialist ontological turn, her theories have been the subject of considerable attention as part of the ontological quest for this thesis and resulted in the publication of a critique of the underlying assumptions of her theories (Everth & Gurney, 2022). I believe that this critique is essential due to the wide application of Barad's relativist ontology in theories of contemporary social science and educational research, in particular with regard to the climate emergency. For myself, this critique was important in consolidating my own ontology. I experienced Barad's (2007) quantum relativism as a risky detraction from my goal to seek Demeritt's (2006) foundation from which to speak truth to power and from which to build climate change education. This critique is also important for connecting new materialism with the realist philosophy of Deleuze and Guattari, which I will expand upon in the next section. Some of the key arguments from our paper (Everth & Gurney, 2022) are summarised and referenced below. For an in-depth reading of our arguments, we refer to our paper.

Barad's (2007) physics-inspired philosophy aims to offer foundations, built on quantum mechanics, towards a new materialist ontology that unites the social with the matter world, based on physical theory. Her book appears to fill a demand for ontological grounding at a time when the anti-realist ideas of constructivism lose standing in the light of society's encounter with material limits to growth (Calder, 2011; Demeritt, 2006). However, despite calling her theory *Agential Realism*, Barad (2007) questioned realism in the traditional ontological sense, based on her idiosyncratic extension of quantum mechanical indeterminism from the micro-world to the macroscopic reality of human experience. Central to Barad's argument is an ontology of indeterminism and relativism within the material world, even at the macroscopic human scale, based on a radical application of specific aspects of quantum mechanics across all scales of reality, including the social domain. Based on her reading of quantum physics, Barad (2007) proposed that relata of any kind, including humans, have no independent existence prior to their relations with others and remain indeterminate outside specific intra-actions *between them*. According to Barad's (2007) application of quantum mechanics to the macro scales, human bodies, things, and words (information) remain indeterminate outside specific agential intra-actions. "'Things' don't preexist; they are agentially enacted and become determinately bounded and propertied within phenomena. Outside of particular agential intra-actions, 'words' and 'things' are indeterminate" (p. 150). Barad bases this view on the observations of microscopic quantum particles and their interaction with measurement apparatuses. These views correspond to Barad's queer feminist paradigm and her proposal that the liberation of human existence from determination is mandated by quantum physics' consequences (Everth & Gurney, 2022). Through Barad's theorising, the perceived stable macroscopic reality of the human perception with seemingly independent and historised entities is seen as a mirage.

Our critique of Barad's (2007) reasoning is based on the application of quantum decoherence theory (Everth & Gurney, 2022). The indeterminism of the microscopic quantum realm that gives rise to Barad's (2007) theories is not observed in the macroscopic world, which appears to behave according to classical Newtonian/Einsteinian theories of physics. Yet, the laws of quantum mechanics, including the superpositions of mutually exclusive states such as Schrödinger's dead and alive cat (Barad, 2007, p. 254), should universally apply. The discrepancies between the observed reality and the underlying equations of quantum mechanics and the possible pathways to resolve them have remained the focus of a long-standing debate within physics since the inception of quantum mechanics. A resolution of this debate has emerged over the last decades from quantum mechanics itself, by the inclusion of the *environment* as a system with an infinite degree of freedom into the formalism of quantum mechanics through the theory of quantum decoherence and quantum Darwinism, based on the extensive work of Zeh (1970), Zurek (1994, 2003, 2009, 2018, 2021), Joos

(2006, 2007; 2013), Schlosshaur (2019), and others. Due to decoherence theory, the macroscopic classical reality with its Newtonian/Einsteinian physics, together with the existing and historised relata perceived by humans, is emerging naturally from the quantum realm due to collective, pervasive, inescapable and *random interactions* of the entirety of the environment with itself. Classical reality is emergent, not as an illusion but as a *manifestation of outcomes* of quantum mechanics. Coming into material being does not require conscious interactions with a human mind or specific interactions between macroscopic relata. The physical reality does not support such an anthropocentric premise. Decoherence and the emergence of classical reality happen with or without us, everywhere and constantly. The wired phenomena of quantum mechanics and the technological marvels they inspire, such as quantum computing and quantum communication, happen in the liminal space between isolation and contact of microscopic particles with the environment.

The emergence of classical reality moves the ontological discussion back into the direction of pragmatic classical realism at the human scale, which sees the world as a system of emergent classical entities, congealing from the vast space of possibilities of the quantum realm, entirely independent of human existence but open to observation, theorising and understanding by sentient beings (P. Clayton & Davies, 2006; El-Hani & Pihlström, 2002). However, any pragmatic ontology must account not only for external referents but also for the representations in the human mind. Human conscious observation, theorising, and understanding operate from within the semiotic domain, the realm of representations, emotive responses, and linguistics, and thus remain removed from the object itself. Human agents are part of the long evolutionary development of life as semiotic agents. Sharov and Tønnessen (2021) argued that biological evolution is accompanied and increasingly affected by semiogenesis and the growing "semiotic capacity" (p. 153) of agents. The authors argued that agential autonomy is related to "semiotic freedom" (p. 163) from determinism. I want to clarify that quantum decoherence and the emergence of classical reality are not equated with simplistic notions of Newtonian style determinism. While the formalisms of quantum mechanics and Newtonian mechanics are deterministic and many aspects of classical reality function in deterministic ways, the complexity of the emergent phenomena within classical reality causes classical reality to be computationally complex so that outcomes of the behaviour of sufficiently complex systems cannot be pre-determined through a shortcut using Newtonian calculus or any form of computation other than running the 'experiment' of the cosmos forward. In a complex reality, even one that is classical at the macro-level, only a reality that is lived step by step will reveal the future state of the universe (Wolfram, 2019). To 'save' social philosophy in vastly complex classical reality from the oppression by some notion of Newtonian determinism, no idiosyncratic interpretations of quantum mechanics, like

the one suggested by Barad (2007), are required. As I point out below, the critique of Barad's form of quantum indeterminism links with Deleuze's realist ontology.

2.2.4 Toward a Pragmatic Critical Realist Ontology of the Possible

Under duress to address the Anthropocene predicaments, and climate change in particular, it would seem appropriate to adopt a pragmatic critical realist ontology that deals with the interface between the emergent material phenomena at the scale of classical reality and the socio-political realities of power and capital that entangle with them. Crucially, such an ontology needs to focus also on the virtual, on what is possible that does not yet exist. This ontology accepts the independent existence of the material world, its laws and responses to our interactions with it, as well as the responsibility of humans to mitigate the impacts of our desires. This ontology should explore the manifold of possibilities for existence beyond current territorialised domains. For education, in particular, and thereby for teachers, an ontology of the possible, but not yet actual, is of great interest in a time when humanity must question and break from last century's traditions of growth and dominance over nature. For such an ontology, I return to Deleuze and Guattari and other authors who have referred to their work. Explicit affirmation of the independent existence of the objects in this world can be found in an essay by Deleuze (2002), who wrote:

> The great principle: things do not have to wait for me in order to have their signification. Or, at least, I have no consciousness of their having waited for me – which from the descriptive point of view amounts to the same thing. Signification is inscribed objectively in the thing… (p. 17).

And DeLanda, in his conversation with Protevi and Thanem (DeLanda et al., 2005), is explicit in crediting Deleuze with the 'rescue of realism':

> Deleuze's main contribution to philosophy, it seems to me, is to have rescued realism (as an ontological stance) from the oblivion in which it has been for a century or more. In some philosophical circles to say that the world exists independently of our minds is tantamount to a capital crime. (p. 65).

However, as DeLanda et al. (2005) stated, Deleuze's ontology is not a naïve ontology of essences but a process ontology, where "the identity of any real entity must be accounted for by a process, the process that produced that entity" (p. 66). Quantum decoherence is that process that is productive of the classical reality and the entities familiar to our experience of the material world. Deleuze and Guattari's concept of assemblages is central to his ontology. For education, a pragmatic critical realist ontology based on the philosophy of Deleuze and Guattari seems especially befitting. Several authors

have unpacked the work of Deleuze and Guattari toward such a goal and applied it to their research projects, and some of those are reviewed next.

Reflecting on Deleuze and Guattari's concepts of rhizomes and assemblages, Bazzul and Kayumova (2016) discuss the development of an ontology for a "critical, social justice-oriented science education" (p. 284). In their work, the authors aimed to liberate teachers and students from reproductive and de-politicised purist science education, embrace the implications of the rich socio-political contexts of our time, and explicitly called for such ontology to include new possibilities of existence. Through this, they aimed to make lines of flight toward new assemblages from the space of possibilities explicit. Bazzul and Kayumova (2016) emphasize the advantage of the assemblage concept as this can "disrupt liberal political ideologies that position the individual as the central unit of politics" (p. 296) and replace the ontology of individualism with an ontology of assemblages, their coding and territorialisation. In doing so, aspects of relationships, differences, and causal links become explicit. This is far removed from Barad's (2007) hypothesis of macroscopic indeterminism as it recognises relational structures and the relata that connect them as real, emergent, historised, observable and malleable.

The 'entanglements' within and between material-discursive assemblages of matter, meaning, and the social are not quantum mechanical in nature but are socio-political, material, and emotional, and are shaped by desires, paranoias, and schizo inspirations. Bazzul and Kayumova (2016) promoted the exploration of assemblages through diagrams as a way of generating representations from and through which novel connections can emerge. It was their work on graphical representations of assemblages and lines of flight that triggered my methodological inspiration to engage my research participants with the generation of assemblage drawings (Everth et al., 2022). I refer to our paper and the explanation of this method in the methodology chapter below (see chapter 3, section 3.3.8), as well as the interpretation of the participants' assemblage drawings in the findings chapters.

Deleuze and Guattari's concepts have been explored as a theoretical tool for mapping subjectification and the complex flows of desire by Ringrose (2011) "through and against discursive/symbolic norms" (p. 598) in educational settings. Ringrose utilised Deleuze and Guattari's concept of "machinic-assemblages" (p. 601) and their affective capacities in analysing power structures and hierarchies of school communities concerning social network sites on the Internet. The power of Deleuze and Guattari's concepts lies in their ontology of affect and production, and in conceptualising territorialisation and coding as intensive variables of assemblages that generate their mechanistic behaviour. Ringrose credited Deleuze and Guattari's ontology and the schizoanalysis that

flows from it for the ability to map “immanence, both re-territorialization and transformative movement” (p. 614) in the setting of her research.

Thinking about post-humanist process ontology in reference to Deleuze and Guattari, Braidotti (2006) pointed to the commonality between Deleuze and Haraway with their shared “serious neo-foundational materialism on the one hand and a rigorous theory of relationality on the other” (p. 200) as inspiration. Braidotti’s (2006) ontology reflects on Deleuze and Guattari’s nomadism concept, with which she evokes hope for bringing about a sustainable future through “a nomadic subject position of flow and multi-layeredness” (p. 207) that explores the space of virtual possibilities and drives transformative processes today by transposing “energies from the future back into the present” (p. 207). The future that Braidotti calls upon is post-humanist and shared with cyborgs and other companion species.

Combining materialism with an ontology of relationality and process strengthens Deleuze and Guattari’s approach. As Kleinhernbrink (2019) stated, “Instead of determining what some thing is or what must exist, Deleuze outlines *how* entities exist” (p. 29, emphasis in the original) and what entities could become. Such an ontology that centres on the *how* is eminently more powerful than an ontology of mere existence. Such an ontology does not understand essences as immutable constituents of reality but sees the world as an assemblage of dynamic processes of production that entangle the *actual* with the *virtual* in the manifold of potentialities. It entangles the ‘*what is’* with ‘*what could be’*. Education connects the young with the imminent virtuality of their future selves. The process of *educare* is a process of energising the lines of flight from the young minds as they are today towards their still virtual but possible individual and collective futures. Education has the potential to expand this from students to society as a whole. This is the hope and also the obligation that education must respond to in this time of existential and self-inflicted predicaments. The age of fossil fuel-powered exponential damage to our ecosystems is merely just over a century old, a snippet of time against the backdrop of millennia of human civilisations. The neoliberal capitalist society appears like a petulant teenage boy, drunken from the testosterone of hydrocarbons and in need of education toward finding its true potential in the yet-to-be, the space of virtual yet already affecting futures. Deleuze and Guattari’s ontology may yet shift society's thinking to grasp possibilities for a sustainable future.

2.2.5 From Deleuze and Guattari to Post-humanism

The post-humanist and new materialist turns have been profoundly invigorated, developed and cartographed with a perspective on politics, social justice, and the transition towards possible post-human reconfigurations through the work of Braidotti (2019c, 2019b). Lacking the territorialisation into humanist transcendent delusions of the superiority of Man, the nomadic state Deleuze and

Guattari described is perceived to constitute a prototype for posthumanist ideals. Braidotti (2019a) developed her theoretical framework for critical nomadic post-humanities on the ideas of Deleuze, giving "non-human elements and technological actors" (p. 33) more prominence compared to foundations in biopolitical scholarship based on the work of Foucault. Braidotti (2019a) argued that critical reason is naturally "nomadic in character" (p. 47) and, unbound from territorialising protocol, "defines the research process as the creation of new concepts" (p. 47) and concludes that "nomadic knowledge is the breeding ground for possible futures" (p. 53). Daigle and McDonald (2022) connected posthumanism with nomadology and argued that "[p]osthumanism has the capacity to affirm new methods for the exploration and expression of life, a nomadology that operates through rhizomatic thinking, assemblages and subversion, through thinking that pursues lines of flight and mulls over plateaux" (p. 10). Braidotti's (2019c) book *Posthuman Knowledge* guides many aspects relevant to this research, and links emerged as points of reference, especially concerning *affirmative ethics*, which is central to education and a consistent guide for Braidotti.

The post-human condition, as Braidotti (2019c) stated, implies our current positioning between two enclosing and accelerating dynamics: the "algorithmic devil" (p. 8) of the "Fourth Industrial Revolution" (p. 8) and its other-than-human cyborgs, AI systems and networks of other-than-human knowledge generation systems, and the "Sixth Extinction" (p. 8), heralded by the "acidified deep blue sea" (p. 8) and the climate emergency. Braidotti (2019c) argued that we are inescapably and with increasing velocity subjected to these self-initiated and inflicted fundamental transformations of our existence, the dynamics of which are driven by the "accelerations of advanced-capitalism" (p. 9) and the "acceleration of climate change" (p. 9). The pressure is on, and Braidotti stated that the post-human challenge is to "strike a balance between these conflicting forces" (p. 9). For Braidotti (2019c), the focus must be on understanding and developing the potential of affirmative ethics "as a collective practice of constructing social horizons of hope, in response to the flagrant injustices, the perpetuation of old hierarchies and new forms of domination" (p. 109). The starting point is "the decentring of Anthropos in favour of zoe/geo/techno relations, and to assess their ability to process pain and construct an ethical subjectivity worthy of our times" (p. 109). Briadotti (2019c) said, "'We' are in this posthuman predicament together, but 'we are not One'" (p. 109). By this, Braidotti means we must approach ethics with an affirmative stance that unleashes the "active powers of life in the affirmative mode of *potentia*" (p. 110). This unleashing of potentiality through affirmative ethical praxis enables positive change and the evolution of ideas, power structures, and realities. Through affirmative ethical praxis, "the cognitive, affective and sensorial means to cultivate degrees of empowerment and affirmation of one's interconnections to others in their multiplicity" (p. 110) become actualized.

Education is a prime example of potentiality becoming actualized. This is, in a way, what education is all about: to actualize human potential with deliberation and under an ethical framework of responsibility. Braidotti (2019c) found that education is becoming increasingly influenced by New Materialist scholarship. She notes that education "has to be consistently posthuman, at both the analytic and the normative levels" (p. 99) and requires "a posthuman ontology and a new ethics" (p. 99). Concerning the vision of a post-human University, Braidotti pointed out the need for transversal connections between and across the faculties and disciplines as a way to enact "an ethically empowering vision of the posthuman subject of knowledge" (p. 101). This comment by Braidotti is equally valid concerning the territorialisation of secondary education into faculties that hinder this traversal with direct implications of climate change education.

Post-humanist theory also opens new perspectives on ethics. In times of global consequences of all actions, ethical *response-ability* (Braidotti, 2019b; C. A. Taylor, 2018) is entangled through all interactions into a global ethical network. Purchasing a product entangles the buyer with the ethicality of its production, its use, and its eventual disposal. In the context of "climating" (Verlie, 2017), this ethical entanglement becomes especially important. In our daily conduct with each other in the social sphere, ethical consequences are part of the many micropolitical intra-actions, just as the macropolitical constitutions and enactments of society's power structures are shaping the wider social world. The ethical web of life is like a lymphatic system of the world, running parallel to and entangled with the physical webs of flows and intra-actions of matter, ideas, power, patterns, resonance and structures.

2.2.6 Summary: Speaking Truth to Power

The ontological discourse of this section had the central aim of tracing elements for a foundation from which to speak truth to power about matter and the more-than-human world, as Demeritt (2006) requested. I argue that this foundation is also necessary for making climate change education successful. Matter does not yield to discourse (MacLure, 2017), and climate change will not vanish through a change of opinion, wishful thinking or a change of constructed representations. Changing the material flows that alter the climate will require policy and agency that enable hands and feet to move matter differently. I argue ontological relativism of the constructivist kind and indeterminism of the Baradian (2007) kind hinder this goal. I hope humanity can find unity in a pragmatic critical-realist ontology from which to progress toward a sustainable future.

2.3 Climate Change and Society

It is now time to traverse the rhizome past the nexus of evidence of anthropogenic climate change and its consequences. The ontological prequel permits addressing climate change from the suggested pragmatic-realist position as a consequence of ontologically real and existing entities and their interaction. Fossil fuels are real and pre-existed our interaction with them for a very long time. Fossil fuels are the product of hundreds of millions of years of deposits of hydrocarbons, which were chemically generated in the process of photosynthesis in the distant past. The energy stored in fossil fuels is literally ancient stored solar energy (Dukes, 2003). The invention of engines that can convert the energy released from burning these fossil fuels into motion unleashed the Industrial Revolution and techno-expansion (Wrigley, 2013). However, within a timeframe of just over one century, the massive release of Carbon Dioxide (CO_2) from burning fossil fuels is now causing unprecedented rates of change to the climate and the ecosystems of our planet. These changes are now threatening the continuation of human civilisation in its current form and are part of triggering a sixth mass extinction event with unimaginable consequences (Ceballos et al., 2020; Cowie et al., 2022; Keller et al., 2018). The notion of 'living in the end times' (Zizek, 2011) is becoming widely shared. A summary of the statements and predictions by climate science is presented below to provide evidence of the seriousness of the issue as justification for the urgent need to make climate change a central topic of education. This summary is followed by a lament about the social diffractions caused by climate change, a review of some of the social activism it has generated, and a segway to the connection between climate change and colonialism. The latter is important in the context of Aotearoa, a nation under a de-facto post-colonial majority rule of Pākehā immigrants of European descent over the indigenous Māori population.

2.3.1 Climate Change Semantics

'Global warming', 'global heating', 'climate change', 'climate crisis', 'climate catastrophe', and 'climate emergency' are all terms used colloquially, in the news media, and in the literature to describe the state and dynamics of the climate system under anthropogenic influences. The plurality of semantics around the phenomenon has confounded communications and perceptions and affected the direction of the public discourse (Bromhead, 2021; Bromhead & Goddard, 2023; Reimer, 2019; Shi et al., 2020).

Initially, the term 'global warming' was predominant, and it is still in use to describe the overwhelming direction of the present climate dynamics. However, because there are many more effects arising within the climate system than warming, the term 'climate change' has become much more widely used since about 2010 (Shi et al., 2020). Both terms had their issues and were prone to deliberate misuse by those wanting to derail the public discourse. Neither term conveyed the severity

of the issue. The term ‘climate change’ opens itself to the retort that ‘the climate has always been changing’, so that is new? Finally, the terms ‘climate crisis’ and ‘climate emergency’ gained popularity in the public discourse. However, as Reimer (2019) elaborates, the terms ‘crisis’ and ‘emergency’ suggest that the phenomenon is episodic and might be solved or naturally pass. Yet this is certainly not the case, at least on the horizon of those currently alive, and likely over the next centuries. When one incorporates the already progressing climate change-related species extinctions into the picture, then any semantics that suggests an episodic character of the phenomenon seems inappropriate.

The plethora of climate change-related terminology remains in flux for the time being. For the purpose of this thesis, the terms ‘climate emergency’, ‘climate crisis’, ‘climate catastrophe’, ‘climate change’, and ‘global warming’ are all used where appropriate and without making an attempt to settle for one or the other exclusively. The participants used these terms interchangeably, as well as the cited and sometimes quoted literature. Climate change semantics and communication is an evolving field, and semantics can have a strong territorialising impact on any discourse. In the spirit of DeleuzoGuattarian refusal of territorialisation and a tendency to favour nomadic thinking, I do not wish to settle on one particular terminology or allow this thesis to be territorialised by semantic exclusivity.

2.3.2 The Statements and Predictions of Climate Science

Climate change is a prime symptom of the summary impact of human activity on the planetary systems. Therefore, the onset of climate change symptoms is one of the measures by which the start of the proposed Anthropocene epoch could be determined. It has been argued that land transformation by early human societies, some 5-8 millennia ago, triggered the first measurable signals of human activity in the climate record (Crutzen & Steffen, 2003). However, the first sustained upward trends in greenhouse gas concentrations began in the late 18th century with the invention of the steam engine. Therefore, as Crutzen and Steffen (2003) argued, the invention of the steam engine should be set as the starting point of the Anthropocene epoch. This invention transformed society due to the ability to convert chemical energy stored in carbon and hydrocarbon fuels via oxidation and the release of heat into rotary motion. From there, the age of mechanised production, propulsion, and eventually, the generation of electric energy via coal, gas and oil-fired generators began (Crutzen & Steffen, 2003). The steam engine, and later internal combustion engines, triggered the extraordinary exponential growth trajectory of human population and activities, referred to by Steffen (2022) as “the great acceleration” (p 15). Climate change today is a direct consequence of the technological explosion triggered by the ability to convert heat to motion and the discovery of large amounts of fossil fuels.

Contemplating the consequences of burning growing amounts of coal, Swedish physicist and chemist Svante Arrhenius (1896) gave a concise account of the consequences of rising atmospheric CO_2 concentrations on Earth's climate. He concluded that rising CO_2 levels in the atmosphere due to the use of fossil fuels would increase the reabsorption of outgoing thermal radiation in the atmosphere and, consequentially, lead to a rise in surface temperatures generated by the so-called 'greenhouse effect', produced by CO_2 and several other trace gases with similar optical properties in the infrared spectrum. Arrhenius calculated that raising CO_2 levels by a factor of 1.5 over pre-industrial levels to 420 ppm (today's level) would eventually stabilise the average global temperature at about 3 to 3.5 °C above preindustrial levels and that doubling of CO_2 levels to 560 ppm would see an average increase of about 5 to 6 °C. His predictions are at the high end of the margins of error of the latest climate models, with Hansen et al. (2022) now setting a range of 3.5 to 5.5 °C for a doubling of CO_2 levels. However, during the rapid industrial expansion of the 20th century, the work of Arrhenius was forgotten. Energy, and fossil fuel energy, in particular, became the "historically specific and internally necessary aspect of the capitalist mode of production" (Huber, 2009, p. 105). Climate change and humanity's prospects were set on rails heading towards a future cliff in the 21st century.

In the 1960s, systematic measurements of the rising atmospheric CO_2 concentration at the Mauna Loa observatory initiated the current concerns about the effect of such greenhouse gas emissions (D. C. Harris, 2010). In 1979, the National Academy of Sciences in the USA concluded that doubling the CO_2 concentration in the atmosphere would cause a temperature rise of 3°C ±1.5°C and predicted more significant warming at the high latitudes (National Research Council, 1979, p. 2). In 1982, Exxon commissioned an internal review on the climate impact of rising CO_2 concentrations (M. B. Glaser, 1982) that warned of substantial and potentially irreversible climatic changes, the melting of polar ice caps and the flooding of most coastal areas. It concluded that a doubling of CO_2 levels would occur by 2090, and mitigation would require "major reductions in fossil fuel consumption" (M. B. Glaser, 1982, p. 2). However, the report was buried, and Exxon started an active campaign to undermine and deny climate science by funding industry-friendly and climate change-denying politicians and conservative political think tanks opposed to government regulation of the industry (Mark, 2016; Oreskes & Conway, 2010).

In 1988, the Intergovernmental Panel on Climate Change (IPCC) was established to "provide governments at all levels with scientific information that they can use to develop climate policies" (IPCC, n.d., para. 1). The IPCC released a series of reports that painted an increasingly dire picture. The first *Summary for Policy Makers* from 1990 predicted warming of about 1°C by 2025 and 3°C by 2100 (IPCC, 1990a) under assumed emissions mitigation. However, on a *business-as-usual scenario* of a doubling of pre-industrial CO_2 levels by 2050, warming of up to 4.5°C and a sea-level rise of up to 1m

by 2100 were predicted, with significant implications for the planetary ecosystems and socioeconomic stability (IPCC, 1990b). The IPCC progressively spoke in a language of certainty and labelled the observed changes in the climate system "unprecedented over decades to millennia" (IPCC, 2013, p. 4) and anthropogenic greenhouse gas emissions to be "extremely likely to have been the dominant cause" (IPCC, 2013, p. 17). In its report from 2021, the IPCC called the observed warming trend unprecedented and is very clear in its leading statement about the cause: "It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred" (IPCC, 2021, p. 4). The IPCC was clear that deep reductions in CO_2 emissions are required in the coming decades to prevent temperature increases past a 1.5 to 2°C range.

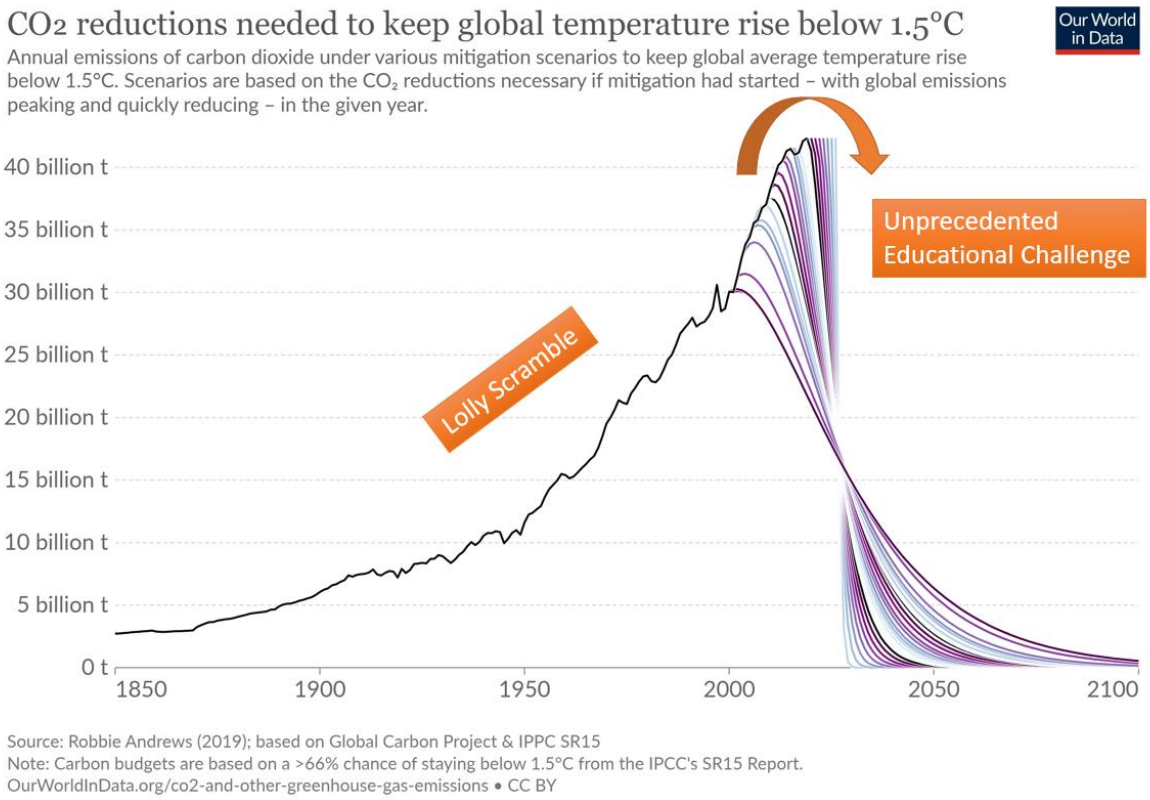
Climate scientists provided increasingly alarming predictions. Steffen et al. (2018) explored the risk of self-reinforcing climate feedback and concluded that the Earth System could be pushed toward a planetary threshold that, if crossed, could cause continued warming on a 'Hothouse Earth' trajectory even if human emissions were reduced. Schellnhuber et al. (2016) suggested that warming of 5°C may be exceeded by the end of the 21st century. James Hansen et al. (2016) stated the potential for multi-meter sea-level rise in 50 to 150 years. In recent decades, climate events, particularly heatwaves and severe flooding, have increased in frequency (Salinger et al., 2019; e.g., Vogel et al., 2019). Wildfires have become extreme in Siberia, North America, South America and Australia. During the years of this study, climate events across the globe have become successively worse. The summer of 2022 set new extremes with extraordinary events of drought in China and Europe and unprecedented flooding in Pakistan (Ripple et al., 2022). Pereira et al. (2020) see the potential for unmanageable and extreme wildfires in the future. In Aotearoa, in the first half of 2023, a series of severe flooding events and a tropical cyclone caused regional devastation and will most likely result in a managed retreat of land use from flood-prone areas (Harrington et al., 2023; Kerr et al., 2023; Wilson et al., 2023).

Heat events are now approaching the physiological human survival limit of 35°C Wet Bulb Temperature (TW) and begin to threaten large populations in the hot and humid coastal regions of China, South East Asia, India and the Persian Gulf (e.g., Freychet et al., 2020; Raymond et al., 2020). Beyond the wet-bulb temperature limit of 35°C(TW), the temperature to which hot air in the shade can be cooled by the evaporation of water, humans cannot shed body heat through sweating, and hyperthermia causes death after a few hours "even for acclimated and fit individuals" (Sherwood & Huber, 2010). These developments could become a driver for unprecedented humanitarian and economic impacts and mass migration. Not only is the future already deterritorialised (Colebrook,

2020a), but physical deterritorialisation due to climate change is becoming a reality. For the millions of people in Pakistan who lost their homes, livelihoods, and harvests to climate change-enhanced extreme flooding, the loss of territory is already actual. Severe climate events will turn millions into nomads as their sessile lifestyle will become untenable, cause intolerable climate extremes in many densely populated areas of the world and cause significant disruptions for some of the planet's most important food-growing regions. Anthropogenic climate change impacts on the biosphere are causing an accelerating reduction in natural habitats and species diversity, comparable to mass extinction events in the paleontological record. The current era is now referred to as the time of the sixth mass extinction (Ceballos et al., 2020; Cowie et al., 2022; Keller et al., 2018).

Figure 2-6

CO2 Concentration and Mitigation Pathways



Note. Adapted from (H. Ritchie et al., 2020). Copyright 2020 by Our World In Data. (CC BY 4.0)

Figure 2-6 above shows the historic annual CO_2 emissions with the added hypothetical path of emissions reductions to limit global warming to 1.5°C from the IPCC Special Report 15 on the impacts of global warming of 1.5°C (IPCC, 2018). I added emphasis to highlight the exponential fossil fuel-predicated exuberance during the *lolly scramble* time of the last century versus the unprecedented educational challenge required to transform society. The contemporary fossil-fuel-powered growth-

economy is predicated not only by the level of carbon emissions but, and this is significant, *its continued growth* (Altvater, 2007; Clark & York, 2005; Stephenson, 2020). I argue that altering this curve requires fundamental changes to how we understand our economy and our individual and societal expectations of what resources this planet has to share with us (Bauhardt, 2014; Gunderson et al., 2018; Schmid, 2019). I argue that changing the course we are on constitutes an unprecedented educational challenge. The mass extinction trajectory, if continued, is irreparable in principle. Accepting such fate knowingly seems inconceivable. Understandably, a growing segment of the population is now rebelling against the current extinction trajectory. I argue that education will become a focal point in the ensuing struggle.

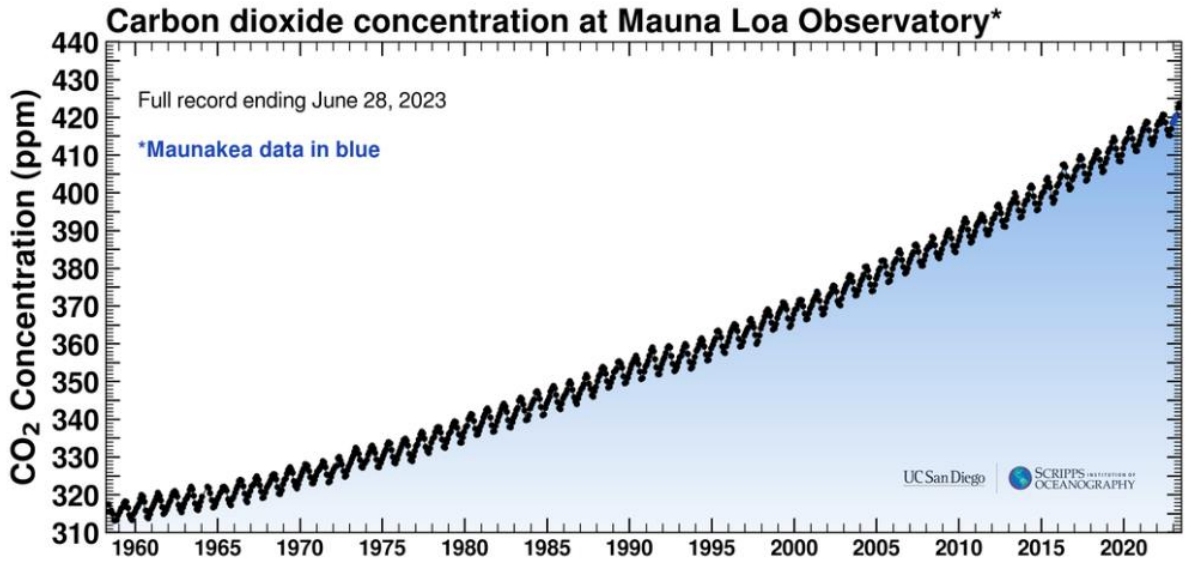
Besides CO_2, methane (CH_4) is the second most potent greenhouse gas, responsible for about 1/3rd of the overall greenhouse effect climate forcing (Collins et al., 2018; Crill & Thornton, 2017; Etminan et al., 2016; IPCC, 2021). Bacterial processes in the rumen of farm animals produce a significant part of anthropogenic methane. Worldwide livestock farming is said to contribute about 14% of the overall climate forcing (IPCC, 2021). This is particularly important for Aotearoa and the context of climate change education here because agricultural emissions produce close to 50% of the entire contribution of Aotearoa to climate change, with ruminant methane emissions making up most of these (Reisinger, 2018). The rural population depends to a significant degree on the economic output of this industry, which sets the teaching of climate change up for particular challenges. Further, a rapid reduction of methane emissions is highly effective in reducing global warming forcing on a decadal time scale due to the relatively short half-life of methane molecules in the atmosphere (IPCC, 2023; Reisinger, 2018).

The Covid-19 epidemic, which played itself out contemporary to this research, saw significant restrictions in human activity, such as air travel and industrial production, during the three years from 2020 to 2022 (Nguyen et al., 2021). The restrictions were at a level that would be hard to imagine as a result of mandatory climate change-related restraints on emissions in the current global political climate. Covid-19 posed a challenge to the capitalist society and provided important insights into social reactions to an external challenge with significant relevance for managing the climate emergency (Fox, 2022; Klenert et al., 2020; Manzanedo & Manning, 2020). However, and this is very concerning, the restrictions forced upon society by the epidemic did not produce a visible dent in the upward trend of the atmospheric CO_2 concentration measurements (see Figure 2-7 and also Figure 6-1). Ultimately, the CO_2 concentration measurements in the atmosphere judge the effectiveness of any emissions reductions. CO_2 concentrations in the atmosphere react quickly to substantial changes in emissions, as can be seen in the seasonal variations of the CO_2 concentration due to the northern hemisphere summer/winter change in plant uptake and emissions of CO_2. Despite reductions in emissions due to

the Covid-19 epidemic, not even the gradient of the Keeling curve has been visibly reduced during this period. The Covid-19 experience shows how incredibly challenging the task will be to reduce emissions sufficiently to affect the current trajectory of climate change.

Figure 2-7

Keeling Curve from 1958 to 2023



Note. The Keeling curve of the atmospheric CO_2 concentration. Copyright by Scripps Institution of Oceanography at UC San Diego (2023). (CC BY 4.0).

Alfred Wallace (1890), who, with Charles Darwin, proposed the theory of evolution, foresaw the predicament of explosive human impacts on the planet with striking clarity 130 years ago:

> And if we continue to devote our chief energies to the utilizing of our knowledge of the laws of nature with the view of still further extending our commerce and our wealth, the evils which necessarily accompany these when too eagerly pursued, may increase to such gigantic dimensions as to be beyond our power to alleviate. (p. 457)

2.3.3 Climate Change Denial and Social Territorialisations

Our growing awareness of anthropogenic climate change and its implications has provoked and amplified dividing societal territorialisations. These territorialisations now place humanity's ability to form a coherent and effective response to climate change at substantial risk. They have been exploited and amplified in a Machiavellian pursuit of power and wealth and the desire for sovereignty over people, environment, and those 'truth-telling elitist experts' and the 'mass media' reporting their

views. In this pursuit, the concept of truth has been eroded and replaced with the power of opinions. Welcome to the post-truth era (Higgins, 2016; Keyes, 2004). Education is embedded within this diffracted society and subject to pressure from political factions as well as the ethical challenges posed by the climate emergency. In this section, literature is explored that illuminates the origins and consequences of these diffractions, with emphasis on education.

Society used to arbitrate ideas in pursuit of the truth largely in a public domain maintained by edited media acting as a filter and clearing house between authors and their audience. Ford (2018) invoked the image of "liberal nostalgia for the democratic and civil public sphere based on truthful exchange at the marketplace of ideas" (p. 2), in which an intelligent public makes thoughtful decisions based on scientific evidence to steer humanity along an enlightened path to long-term successful progress. This nostalgic image differs greatly from the political and social reality in which we find ourselves in this crucial yet deeply divided time. The explosive expansion of the Internet and social media, where everybody can now be a publisher, has created "an endless digital forest of mediocrity" (Keen, 2011, p. 3), where opinions are trumping facts and expertise. Misinformation proliferates rapidly on social media, driving public opinion apart from the views of scientists and experts on climate change, immunisation and other important matters (S. Iyengar & Massey, 2019; Treen et al., 2020). Lewandowsky et al. (2017) argued that the generation of "alternative epistemic realities" (p 359), fostered by algorithms in social media, such as Facebook, which "custom-deliver content consonant with a user's likes and behaviours" (p 359), is creating a 'post-truth era' and is impacting the functioning of democracy.

Capitalism, neoliberalism, and individualism contributed to the disempowerment of facts and the rise of the post-truth era through the exponential multiplication of voices on the Internet and the tribal communities it enabled. According to Lewandowsky et al. (2017), a shift from valuing the social capital of "good will, empathy, trust among people, trust in public institutions, and civic engagement" (p.357) to valuing private capital and wealth occurred over a multi-decadal time frame from the 1960s onwards. This shift resulted in a gradual decline in willingness to become involved in civic duties, environmental activism, and social cohesion. The situation is exploited by political agendas from the neoliberal right through the deliberate generation of divisions, doubt, and disinformation. Lewandowsky et al. (2017) cite Farrell (2016) and his extensive analysis of corporate-funded climate denial rhetoric and the polarizing effect this had on the climate debate. Climate change denial is perpetuated by deliberate misinformation and conspiracy theories, erodes trust in experts and diminishes engagement in public climate change policies. The disempowerment of facts suits the interests of polluting industries to liberate themselves from social and legal constraints (Oreskes & Conway, 2010).

The diffractions and proliferation of alternative media raise questions about the ability of democracies to respond coherently to crises such as the climate emergency or the Covid-19 crisis (Fiorino, 2018; Fish, 2016; Jasanoff & Simmet, 2017; Povitkina, 2018). Hickman (2010) cited the influential English environmentalist Lovelock, saying that democracy may need to be put on hold to tackle the climate crisis. Effective democracy relies on a well-educated electorate with a reliable anchor in evidence-based thinking (Fortunato & Panizza, 2015; Obydenkova & Salahodjaev, 2017). However, education has been challenged by the devaluation of facts. World-views often appear impervious to change through facts, and evidence-based arguments can backfire (Hart & Nisbet, 2011) and may even result in the deeper entrenchment of preconceived notions (Muis et al., 2015; Trevors et al., 2016).

Climate denialism has been part of the territorialisation and coding of political conservative assemblages in the West (Hatzisavvidou, 2021; Hess & Renner, 2019; J. Nelson, 2020), including parts of the conservative Evangelical Christian movement in the USA (Veldman, 2019; Zaleha & Szasz, 2015).[6] Concerning the developments in the USA, Nelson (2020) interprets this territorialisation and coding as a result of growing challenges to white male privilege and power. Nelson argued that pro-masculine attitudes, misogyny, racist ideology, climate change denial, and the 'Make America Great Again' movement are linked as "compensatory reactions to modern-day racial, gender, and climate-related anxieties" (p. 282). The rise of toxic masculinity culture, amplified by the right-wing culture wars, came head to head with climate change activism in a recent Twitter exchange between the misogynist Internet influencer Andrew Tate and climate activist Greta Thunberg (Solnit, 2022). This Twitter exchange is prototypical of the connection Nelson described. And it may yet, due to its notoriety in the media, exert interesting deterritorialising pressures on the assemblages of climate denial by making the connections between climate denial and toxic masculinity explicit. The drift to the far-right in significant parts of the Republican party is now threatening democracy in the USA through the denial of election results and the open support for the treasonous behaviour around the 2020 presidential election (Jacobson, 2021, 2023). Due to the connection of this movement with climate denialism, the prospects of humanity solving the climate crisis are in peril too (Bomberg, 2021; Fiorino, 2022).

Over the last several decades, climate change has put a focus on the fundamental ontological territorialisations between the natural and the social sciences, as referenced by Smith's (2005) "warring tribes" (p. 108). As stated earlier, radical constructivist theories played a surprising part in

[6] The apocalyptic beliefs of the evangelical movement invalidate ideas of a need to save the planet. Environmentalism is portrayed to be in conflict to evangelical beliefs in dominance of humans over nature and as a neo-pagan risk to the authority of conservative churches (Zaleha & Szasz, 2015).

the diffraction of society, academia, and education with regard to climate change denial (Hansson, 2020). I refer here also to section 2.2, where the matter of radical constructivist influence in academia was discussed in the context of the ontological turn in social science theorising.

Unsurprisingly, in Aotearoa, climate change denial is particularly entrenched in those parts of society that directly benefit from emissions-heavy behaviour. Privilege, entitlements, and fear of change are powerful territorialising factors that motivate desires and lead to the entrenchment of positions, especially in the coal-producing areas around the West Coast of the South Island and rural areas where the predominant livestock industry, dairy in particular, is responsible for the lion share of the country's greenhouse gas emissions. For the past decades, the powerful farming lobby has prevented government policies from being implemented that could force a reduction of stock numbers and farming emissions (Corlett, 2022). The current climate of growing economic uncertainty is fuelling a rise of populist movements among traditionally conservative sectors of society in Aotearoa that unite various grievances against government actions, progressive ideology and scientific experts with nationalistic tenors and a revival of neo-colonialist white privilege sentiments (Cunningham, 2022; Gibson, 2021). These diffractions cloud the horizon for climate change education in Aotearoa, especially in districts where local school boards made up of farmers and other conservative sectors of society may wish to restrict the type of climate change education in their schools that is suggested by this study.

Besides climate change denial, Aotearoa has not been left untouched by the growing general distrust in democratic institutions arising from online tribalism, disinformation, conspiracy theories and deliberate attacks on the cohesion of society by actors who wish to destabilise our societies. Declining trust in experts and growing social divisions kept many democratic countries struggling, in particular, since the election of Donald Trump to the presidency in the USA, Britain's exit from the EU (Brexit), and the Covid-19 epidemic. Gluckman et al. (2021) responded to these developments and were deeply concerned about the loss of social cohesion in Aotearoa and the ability of our society to maintain trust in the structures and institutions of governance. Their comprehensive report foreshadowed the explosion of extremist and violent protests on the lawns of Aotearoa's parliament in February 2022 against the government's handling of the Covid-19 epidemic (Hannah et al., 2022), driven by a confluence of far-right agitation and a "never-seen-before popularity with misinformation, disinformation, and extremist thought" (p. 138). These deeply concerning diffractions amplified by the Covid-19 epidemic are suggestive of even deeper divisions arising in the future if governments were to legislate effectively against climate change-enhancing behaviour and thereby impact people's perception of freedom and entitlement. Education and its institutions must continue to earn the trust of society. As climate change and other Anthropocene challenges deepen, education is obligated to

work toward greater cohesion in society and building trust. Raising responsible citizens will become a key objective for education in the coming societal tensions with regard to mitigating and adapting to climate change.

The territorialisation and coding of tribal political assemblages, particularly the progressive/conservative divide, are dangerous and prevent the agile and inspirational search for successful lines of flight toward a sustainable tomorrow, such as those sought by climate activists, from the abyss-seeking trajectories of our current time.

2.3.4 Climate Activism

The post-truth state of affairs, and, in particular, the denial of scientific expertise and climate science, has evoked a sense of growing despair among scientists, environmentalists and those within society who count themselves as accepting scientific expertise. I call this assemblage here collectively *progressives* in contrast to the *conservatives* and their associated climate denialism and the politicisation of climate change (McCright & Dunlap, 2011).[7] This section outlines some of the diffractions and agitations emanating from the progressive stance. Just like in the case of the conservative climate denial movements, the application of the ideas of Deleuze and Guattari leads to conceptualising climate activist movements as coded and territorialising assemblages.

The discrepancy between stated political ambition and a lack of action is fuelling rising climate activism, especially in the young generation, adding potential but also challenges to education. The political and environmental realities challenge teachers and schools to take sides in the climate debate. With the worst climate change impacts still further into the future, the fate of the students in front of them troubles teachers. Over the last decades, many local and global climate activist movements have formed[8]. Roser-Renouf et al. (2014) argued that due to government failings, citizen activism would be "the most efficacious method of achieving emission reductions" (p. 163). Among the most noteworthy global groups at the moment are 350.org (350.org, n.d.), 'Just Stop Oil' (*Just Stop Oil*, n.d.), and the 'Extinction Rebellion' (Extinction Rebellion, n.d.) movements. These movements, in particular, 'Just Stop Oil' and 'Extinction Rebellion', maintained a strong public profile with disruptive and sometimes shocking protest tactics such as gluing themselves to the frames of precious works of art in museums or blocking inner city traffic (C. Farrell et al., 2019; Gunningham, 2019; Ozden & Glover, 2022; Slaven & Heydon, 2020). While some have argued that their shock tactics would be

[7] The division in progressives vs conservatives with regard to climate change is here used as a label. Overcoming this division is obviously required to make progress. However, for the debate of the status quo this thesis finds itself in at the present time, these divisions are prevalent and reflected also in the political spectrum of Aotearoa.
[8] For a review of climate activism based on the example of the UK, I refer to the social movement analysis of climate activism by North (2011).

counterproductive, Ozden and Glover (2022) argued that despite these forms of protest, there was no drop in public support of climate change-mitigating policies. However, apathy with regard to climate action remains commonplace in the wider population. McAdam (2017) concludes that the promotion of taking ownership of the issue, the shrinking of time horizons, and the emotions of fear, anger, hope, and belief in the ability to succeed will be required to overcome public apathy and trigger the wide-spread activism that will be needed to form effective climate activist movements. The global Covid-19 pandemic provided just such a *shrinking time horizon* for modelling responses to difficult global issues such as climate change (Klenert et al., 2020).

Youth activism has often been a key driver for political change. Concerning climate change, youth activism for obvious reasons – their future is at stake – has become a vital element of the struggle. Kirshner (2007) wrote about youth activism as a context for learning and development and cited Erikson (1968):

> It is the young who, by their responses and actions, tell the old whether life as represented to them has some vital promise, and it is the young who carry in them the power to confirm those who confirm them, to renew and regenerate, to disavow what is rotten, to reform and rebel. (p. 258)

Youth activism centres on the essence of our life expectations. It centres on entitlement thinking and the rights of the individual versus those of society, our species, and the more-than-human world we evolved from and remain predicated by. In Greta Thunberg and her plea to '*unite behind the science'*, climate activism found its *idol* and global voice (Parker, 2019; Watts, 2019). However, climate activism is still searching for its unifying *ideology*. Soborski (2020) argued that "to move towards forming a counterhegemonic movement with a real potential to challenge neoliberalism, anti-neoliberal activists and intellectuals should again take political ideas and ideals seriously" (p. 12). Being against emissions and industry-sponsored right-wing politics is no substitute for a coherent ideology that promotes a climate change-mitigating utopia and the pathways that lead to it. Progressives must, as Soborski (2020) stated, "stand for something and, to know what this something is" (p. 12). I argue that to work towards such visions, the sphere of education would need to engage in political discourse towards a unifying utopian climate change ideology (e.g., Birch, 2020; Lewis, 2006; Rousell et al., 2017). Greta Thunberg's visionary act of engaging in school strikes for climate action triggered a worldwide movement of youth action that brought the climate issue into schools (Boulianne et al., 2020; Bright, 2023; Jung et al., 2020). Climate scientists themselves, driven by their despair over what they know about the severity of the crisis and the lack of action and a deep sense of moral obligation (Oreskes, 2020), have joined the ranks of activists and inspired the youth (Grantham, 2012;

Quackenbush, 2022). Climate change and environmental activism has found a mutually enhancing synergy with the global rise of indigenous decolonisation movements, with particular relevance for Aotearoa and for education (Lazrus et al., 2022; Mbah et al., 2021; Munshi et al., 2022; Thornton et al., 2019).

2.3.5 Colonisation and Climate Change

Climate change can be viewed as a consequence of the colonisation of the world by Western extractive practices and the capitalist economic model, resulting in "intertwined apocalypses of colonization and climate change" (Howard Sandoval & Horton, 2023, p. 177). When conceptualising colonisation in Deleuze and Guattari's language, we could speak of the *despotic colonising machine* that deterritorialises indigenous cultures and reterritorialises them as colonies of European empires (Patton, 2006) while at the same time unleashing rapid transformations of ecosystems and ultimately climate change, through the global colonisation of society by fossil-fuel enabled technology. Whyte (2017) argued that climate change could be understood as a consequence of the colonisation of the planet by Western culture and technology that "paved the way" (p. 154) for the carbon fuel-based economies and deterritorialised indigenous people from sustainable ways of living. Mitigating climate change and achieving sustainability is contextualised by indigenous forms of relating to the world, and, as Whyte (2017) noted, might lead to futures becoming indigenised.

Rethinking our relationship with the material world and harmonising the Noosphere[9] with the realities and limitations of the planetary systems in the context of decoloniality leads to the suggestion that we should consider "walking backwards into the future" (O'Sullivan, 2019) with the help of indigenous wisdom. Indigenous cultures, before colonisation, generally lived in comparatively sustainable relationships with nature. The dominant Western culture's subjugation and eradication of diverse Indigenous philosophies has impoverished human cultural capital and toolkits for dealing with the climate emergency. Thornton et al. (2019) trace the "epistemic history that has led us to the brink of 'widespread and irreversible' global impacts of climate change" (p. 2) and re-examine the human-nature relationship through a decolonisation lens with reference also to indigenous philosophy. Citing Plumwood (2002), Thornton et al. (2019) argued that our propensity for subjugating and dominating nature is causally linked to our collective irrational denial of the true extent of the climate emergency. They see parallels with the domination over and subjugation of "women, minority groups, and the economically and environmentally disadvantaged" (Thornton et al., 2019, p. 5). Citing Dotson (2011), Thornton et al. (2019) pointed to the loss of local indigenous knowledge and philosophy as a

[9] Noosphere or sphere of thought, is a "paradigm of development, mind/culture, and hope" (Shoshitaishvili, 2021, p. 1), encompassing awareness over humanities influence on the biosphere.

consequence of the "epistemic side of colonialism" (p. 5) and, linking directly to this study's focus and theoretical approach, they argued, that "educators must become traitorous identities" (p. 6) who "cultivate an ethical, ecological rationality" (p. 6) by rethinking modernity's Cartesian axioms of place and being. Environmental education can be seen as a decolonisation exercise in which "education needs to trace the *moral memory of place*" (Thornton et al., 2020, p. 7) to grow and strengthen the relationship between humans and nature. In a similar voice, Whyte (2017) viewed climate change as a form of "intensified colonialism" (p. 154) and believed that a revival of indigenous knowledge is instrumental in uniting communities and renewing and restoring relationships between humans and non-humans.

The deterritorialising impact of climate change on the Western worldview acts like an accelerator for a turn to indigenous ideas of living and the respect indigenous cultures tend to foster in their ontologies for the more-than-human world. Climate change activism and indigenous voices found common ground, the unsettling of Western colonial domination and healing humanity's relationship with te taiao[10], the natural world, that gave rise to humanity itself (Carter, 2019b; Munshi et al., 2022; Thornton et al., 2019). Decolonisation struggles are focused on the liberation of indigenous groups in political, legal, economic, and cultural terms. However, considering the extractive and environmentally destructive habits of contemporary neoliberal capitalism and the expansionist economic practices of Western modernity as a colonising culture in its own right, all of humanity can be seen as having been colonised by this paradigm.[11] Viewing climate change as a consequence of the colonisation of humanity by a destructive socio-economic paradigm becomes useful as a perspective that can unite humanity in a common struggle. Gruenewald (2003), in his *Critical Pedagogy of Place*, suggested that we need a process of "decolonisation and reinhabitation" (p. 8) of our physical and mental place of being, to free ourselves from our self-generated destructive paradigms and to become indigenous again to planet Earth. Becoming indigenous again can be understood with reference to Gruenewald (2003) as a process of reinhabitation within the local ecology and learning to apply the appropriate cultural knowledge.

Grounding discourse in metaphors of colonisation and decolonisation, as Smith and Katz (2005) argued, can reveal the domination of hegemonic cultures in the practices of our everyday lives. Overcoming climate change then morphs into a broader emancipatory struggle against *coloniality*, the dominance and normativity of current Western modernity and its seductive powers through which

[10] Te Taiao is the Māori word for the environment that contains and surrounds us.

[11] The deterritorialisation of indigenous commons and reterritorialisation into private property during the enclosure movement from the 15th to the 19th century in England exemplifies that the mechanisms of colonisation are not limited to international occupation, nor are a matter of the past or limited to physical property but extend to intellectual commons (Boyle, 2011).

colonial oppression is perpetuated (Mignolo, 2007; Quijano, 2007). Paraphrasing Habermas (1976) and reflecting on Thornton et al. (2019) and their view of environmental education as decolonisation, we need to emancipate ourselves (decolonise) from that in us that causes our self-destructive propensity to continue operating in rationally indefensible ways because our power to act otherwise relies on disempowering *our own* so *successful* expansionist greed.

Similar ideas are offered by Stein (2019), who argued that we don't just suffer from a problem of knowledge but foremost from an unethical "habit-of-being" (p. 198), which arises through the denial of our entanglement with the exploitative practices of our capitalist society and from which we should liberate ourselves by a decolonial discourse. With regards to educational praxis, Stein (2019) cautioned that as long as educational grappling with environmental 'civilisational despair' funnels the energy back into further 'promises' of solar-powered and human-centric modernity, we are missing the boat. He argued that "if we instead approach climate change and other interrelated crises from the perspective of decolonial critiques, we get a very different story" (p. 204). Stein reflected here on the risky idea that technological progress and solar power will simply solve the issue. However, as long as society maintains the fatal growth-dependent economic trajectory, gains in energy efficiency may result in more energy being used overall[12]. This realisation leads to degrowth theories, which are gaining growing attraction (Hickel, 2016; Hickel et al., 2022; Perkins, 2019). On educational institutions, Stein remarks that we may need to treat them as a "transitional site in which to prepare for an uncertain future" (p. 206).

The philosophy of Deleuze and Guattari has been instrumentalised in the search for postcolonial futures by Bagnall and Patton (2010), editors of a substantive collection of essays on the potentials and conflicts of Deleuze and Guattari's concepts and metaphors in the context of decolonisation. As the editors pointed out in their introduction to the collection, there are abundant motives and metaphors in Deleuze and Guattari's writing that link to colonial and decolonial discourse. Yet, Deleuze and Guattari remain disengaged from explicit engagement with postcolonial issues, which, as the editors state, has been interpreted as a Eurocentric disregard, "self-interest, a neo-imperial motivation or a hidden or unacknowledged desire to deflect attention away from the political concerns of the postcolony" (Bignall & Patton, 2010, p. 1). Bignall and Patton stated that some of Deleuze and Guattari's metaphors, particularly nomadology, have been seen as a direct appropriation and intellectualisation of indigenous culture into Western philosophy while remaining ignorant of colonialism's devastating impact on the colonised. They pointed to Spivak's (2015) essay *Can the*

[12] This is referred to as the 'Jevons paradox'. (Freire-González & Puig-Ventosa, 2015)

subaltern speak[13] as a prime example of this critique. Bignall and Patton (2010) highlighted Spivak's (2015) argument that troubling forms of exclusion arise "when resistance to domination must be normatively 'spoken' through the same terms of subjective representation that have historically been the cause of imperial oppression" (p. 5). What is spoken and what is heard are often different because semantics travel routes of resonances that are elicited within the listener's mind based on pre-configured cultural settings. Spivak's subaltern must speak and be heard on her own terms. This problem is obviously common to all Western writers who engage with and give voice to the 'others', Spivak's subalterns. However, Bignall and Patton (2010) state that Deleuze and Guattari's concepts have "long been taken up by others in their efforts to think about colonialism and postcolonial experiences" (p. 3) and give examples based on the literature. Deleuze and Guattari's concepts have a universality about them, which makes them useful and applicable in a wide range of contexts, including the engagement with postcolonial work.

Mitigating and adapting to climate change is a global challenge affecting all cultures. Lazarus et al. (2021) highlighted the potential of bringing about the "cultural climate change" (p. 1) required to mitigate the climate crisis through intercultural collaborations and interactions with indigenous knowledge. They pointed to the need to be conscious of the "locus of power" (p. 2) in these relationships. Indigenous cultures have endured a long history of exploitation and appropriation of their land and culture and are weary of a new wave of intellectual colonisation by Western philosophy. As Latulippe and Klenk (2020) argued, indigenous knowledge cannot be simply appropriated into Western scientific concepts but is "inseparable from the socio-cultural, political, legal and other grounded, largely place-based relations and obligations that give rise to holistic knowledge systems" (p. 7). Viewing indigenous knowledge as merely supplemental to Western science and useful in fostering environmental goals subjects indigenous culture to a new wave of colonial exploitation. Latulippe and Klenk conclude that "Indigenous knowledge is inextricably linked to Indigenous self-determination, rights and responsibilities" (p. 10). The protection of indigenous knowledge is therefore a growing concern within the context of humanity's search for climate change solutions (Brewer II & Warner, 2014).

2.3.6 Aotearoa and Climate Change

Aotearoa is a small county with about five million people. However, on a per capita basis, Aotearoa ranked near the top of the list of greenhouse gas emitters in 2019, next to the USA and Russia (EPI, n.d.), due mainly to the methane emissions from the large-scale ruminant farming industry, which is responsible for almost half of the nation's overall greenhouse gas emissions. On an international

[13] Spivak's essay was first published in *Marxism and the Interpretation of Culture* (C. Nelson & Grossberg, 1988).

comparison, the country's emissions reduction effort has been poor. Due to the expansion of the dairy industry over the first quarter of the 21st century, Aotearoa's net greenhouse gas emissions have been rising over this period (MfE, 2022a). Farming has a strong political position in Aotearoa, and subsequent governments have been unable to introduce policies that would lead to meaningful emissions reductions in the farming sector (Oram, 2022).

The Labour Party-led government that took office in 2017 introduced climate change legislation to achieve net zero emissions by 2050 (Climate Change Response (Zero Carbon) Amendment Act, 2019) and established a Climate Change Commission tasked with advising the government on emission budgets to achieve this goal. See also the *Government Climate Change Work Programme* (MfE, n.d.). Introducing a clean car rebate for the purchase of electric vehicles was one of the measures that this government introduced. However, at the time of this writing, the Labour-led government seems poised to lose the 2023 election, and the opposition parties on the right have pledged to repeal many of the country's current climate change-related policies and legislation.

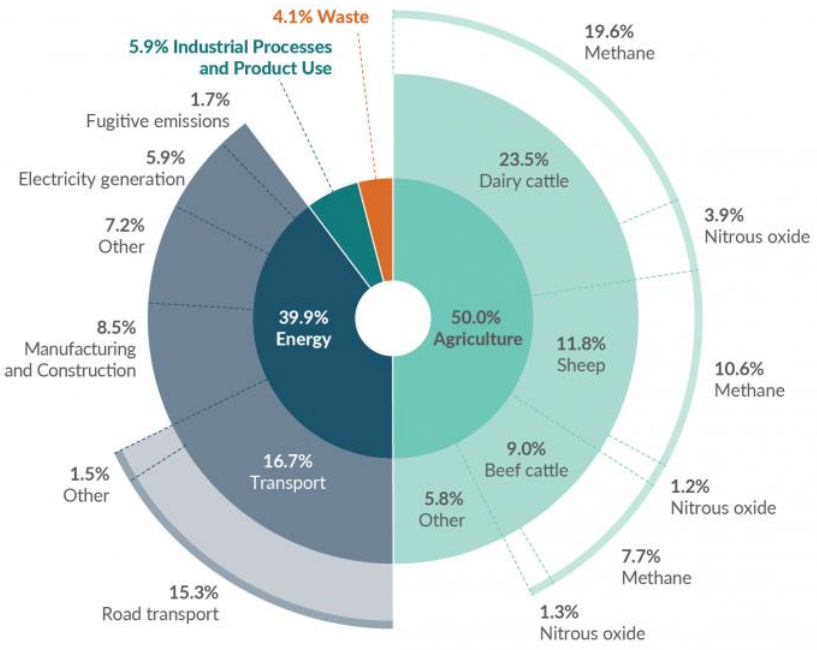
The election of 2023 is held on the backdrop of a year of exceptional climate change-invigorated weather extremes. Aotearoa is a country with a maritime climate, and therefore, changes in the ocean temperature have a significant impact not only on the coastal ocean ecosystems but also on atmospheric moisture content, land temperatures and rainfall. Against the backdrop of significant ocean heatwaves over the last several years (Salinger et al., 2019, 2023), the year 2023 started with a sequence of extraordinary rainfall events in January, including the passage of cyclone Hale just to the east of the country. These events were followed in February by ex-tropical cyclone Gabrielle, which inundated already drenched soils with exceptional rainfall, triggering landslides and debris-laden flooding, especially in the East Coast communities around the towns of Gisborne, Napier and Hastings (Harrington et al., 2023; Kerr et al., 2023; Wilson et al., 2023).

The National Institute of Water and Atmospheric Research (NIWA) called the first half of 2023 "the wettest first half of the year on record for several areas in the northern and eastern North Island" (NIWA, 2023). The climate change impacts of 2023 rendered numerous properties in several regions of Aotearoa uninhabitable and started a serious discussion on 'Managed Retreat' from flood-prone and coastal areas (Arnold & Elias, 2023; Fu et al., 2023). Already, the risk forecasts from flooding, insurance retreat and the viability of property mortgages are generating considerable concern for the country's economic outlook, as reported by the Reserve Bank of New Zealand (Newman et al., 2023). The population of Aotearoa is undoubtedly becoming aware of the severity of climate change impacts. However, a sector of the population still denies not only the basic science behind climate change but also the notion that Aotearoa, as a country of only five million people, is obligated to contribute to

global climate change mitigation efforts. This notion is held, in particular, in the rural areas of Aotearoa and the farming communities, which disproportionately contribute to the country's emissions (see Figure 2-8).

Figure 2-8

Gross Greenhouse Gas Emissions in 2020 in Aotearoa



Note: Gross Greenhouse Gas Emissions in 2020 by Sector, Sub-category and Gas Type in New Zealand (MfE, 2022a)

During the 2023 election campaigns, populist politician Winston Peters (Oldfield & van Veen, 2023) tried to capitalise on votes from the climate change denial segment of the population by denying that human impacts on the CO_2 concentration played a significant role in the climate and denying the Aotearoa had a role to play in global climate change mitigation (A. Smith, 2023).

The resurgent indigenous voices and political powers of Māori (Cram et al., 2018; Hampton, 2020; Mataira, 2013) place Aotearoa into the context of the discourse on colonisation and climate change. For an in-depth introduction to the indigenous approaches to climate change for Aotearoa, I refer to the comprehensive book by Carter (2019a). However, colonisation by Western empires caused a devaluation, loss, and often deliberate erasure of indigenous environmental knowledge systems. This was especially also the case in Aotearoa and, as Skipper (2020) argued, and resulted in the loss and threats to the preservation of important "Māori Environmental Knowledge (MEK) of

Weather and Climate" (p 137). As Skipper explained, MEK comprises a framework of observations, belief systems, and cultural and environmental practices relating to the land, the sea, and the living environment, which had grown over centuries through oratory within Māori culture and educational practice. This knowledge assisted iwi[14] in planning their essential activities, such as planting, harvesting, fishing, and predicting the weather and the rhythms of the seasons. Skipper (2020) stated that the colonisation of Aotearoa by European settlers had a "catastrophic effect on Māori pedagogy" (p. 127), which interrupted the intergenerational transmission of indigenous knowledge, including knowledge of the climate and weather.

It has been recognized that climate change and climate change mitigation will impact Māori interests significantly (MfE, 2007). Māori researchers in Aotearoa, particularly in education research, are responding to Māori scholars' plea to listen to the culture (A. Macfarlane & Macfarlane, 2019). The search for sustainable futures finds common ground with the search for justice and decolonisation, not only in Aotearoa but across the world. The ongoing decolonial political process in Aotearoa, kept alive due to the living nature of Te Tiriti, will maintain and inform the discourse with indigenous systems of value and the relationship to the more-than-human world in an active manner. It holds promising perspectives for developing humanity's relationship with the ecosystems in which we live and can inspire visions for a sustainable future (Munshi et al., 2022; Royal, 2008; Skipper, 2020).

2.3.7 Summary: Humanity at a Crossroads

Humanity stands at a crossroads. Last century's fossil fuel-powered exponential growth trajectory is running out of steam and into a time of significant consequences, and predictions of environmental and climate breakdown cloud the future. A grand reckoning seems to be approaching. The present is becoming increasingly deterritorialised (Colebrook, 2020a). Societal diffractions between denialists and activists are rising. Colonial sins of the past are being tabled in the political discourse together with the daily onslaught of climate change-driven environmental disaster news. In this context, educators must seek a path forward that connects the youth with the brighter futures we might have. As I argue below, the Nomadism concept of Deleuze and Guattari (1987) offers a productive perspective for this to happen.

[14] Iwi is the term used by Māori for their largest social units within Aotearoa. Iwi have often specific regional roots and trace back their ancestry to the migrations by waka (sailing canoes) from the Pacific Islands.

2.4 Educators as Nomad War Machines

Many of the revolutionary concepts Deleuze and Guattari developed are particularly useful in our time for the "retheorisation of resistance consequent upon the globalisation of power" (Reid, 2003). In Deleuze and Guattari's time, it was resistance against powers that constrained liberty; today, it is resistance against powers that keep society on course to ecological self-destruction. Deleuze and Guattari's concept of the *Nomad War Machine* (NWM) is particularly interesting in considering this.[15] Deleuze and Guattari (1987) state that the NWM "is an assemblage that makes thought itself nomadic" (p. 27), makes society change along lines of flight, and "is of nomadic origin and is directed against the State apparatus" (p. 253). NWMs work on and through people toward liberation and creativity. Sidebottom (2021) dedicated his thesis to applying Deleuze and Guattari's concepts for a vision of education for post-human times, focusing on the concept of NWMs. Sidebottom summarised, "[t]o be nomadic then, is to detach oneself from the kind of thinking that prioritises loyalty to the organisation above loyalty to the self and others" (p. 21). Instead, nomadic thought liberates the individuum and enables movement "in 'smooth' non-hierarchical spaces, not the 'striated' zones of the state, where moves are regulated and bureaucratised" (p. 21). As I argue in the discussion section of this thesis of the research findings, the desire for change in the participants gives evidence to nomadic thought and the emergence of teachers as NWMs in the parlance of Deleuze and Guattari.

The education system, in its current form, presents itself as beholden by a plethora of territorialisations into structures, lines of power, and neoliberal paranoias that hold it hostage to cultural reproductive practices with a focus on assessment and standardisation, timetable constraints, and entrenched processes. Responding to the enormous challenges of the Anthropocene predicaments will require agile and system-wide responses on a local, regional, national, and global scale. Bringing about Deleuze and Guattari's 'new Earth and new peoples' should be the objective of a post-humanist education. However, this will require bold and deterritorialising leadership (Everth & Bright, 2022) as well as the emergence of strong bottom-up action by teachers, students and communities to summon a "posthumanist utopia" (Everth et al., 2022, p. 2) into being. Deleuze and Guattari's concept of NWM can be applied to educational leadership and teachers, students, and community leaders. Sidebottom (2021) argued that NWMs could enact posthuman education by stepping "outside traditional hierarchies of state control as mobile navigators" (p. 123) and into Deleuze and Guattari's smooth plane of immanence through absolute deterritorialisation. In doing this, Sidebottom further argued that educators as NWMs can gain the power to enact lines of flight

[15] I turn to the nomadism concept here despite the critique it faced as a possible form of cultural appropriation due to the centrality of nomadism in the thinking of Deleuze and Guattari (Bogue, 2004; Miller, 1993).

toward the exploration of new ways of teaching and being. In the next section, teacher agency is discussed based on literature and examples.

2.4.1 Agents Provocateurs or Assuagers: Teachers in Times of Social Change

Teaching in times of significant social change, upheaval, and transformations poses a particular challenge. Education systems are generally structured to promote a continuation and enhancement of the societal status quo: "Schools, by their very design and purpose, preserve the status-quo by mitigating personal crisis to the exclusion of public crisis" (Houwer, 2014, p. 116). Reproductive futurism is one of education's organizing principles (Ford, 2018, p. 15). However, in times of crises and in the times leading up to significant societal transformations, and especially if the paradigms of the status quo are causative to this crisis, then teaching in a reproductive paradigm can become cognitively dissonant for those who are aware of the reasons for this crisis yet feel mostly powerless to change or challenge them. Teachers like the research participants, who strongly believe that climate change and the societal behaviours that cause it are existential issues and should become a central topic of education but are prevented by the system from acting accordingly, suffer cognitive dissonance through an "induced-compliance paradigm" (Harmon-Jones & Mills, 2019, p. 5).

> *An extreme example of induced compliance dissonance is my mother's situation as a beginning teacher in a boys' high school under the Nazi regime in Berlin, Germany, during WWII. She was expected at school to promote Nazi pro-ward propaganda as part of her teaching. Yet, she reported later that she knew that her senior students had an average life expectancy of perhaps six months after graduating from school as young recruits and cannon fodder at the front of Hitler's insane war. How did she possibly cope?*

This research is centrally about the teachers themselves, their views on education and climate change education as a challenge, and their struggles for authenticity and authentic engagement. It is about their struggle with societal apathy, student apathy, and institutional constraints. It is about their mental space and health in navigating these challenges and their expectations of themselves. It is about their view of reality, their ontological and epistemological premises from which they teach, and their hopes and visions.

A search for literature on the specific issue of the *lived experiences and work* of teachers who found themselves in conditions of significant societal upheaval did not bring up many results. What are the stories and where is the research on these *Agents Provocateurs* or *Assuagers*, Deleuze and Guattari's nomad war machines or compliant citizens doing as they are told, those breaking the mould of expectations and striving for authentic if not revolutionary change, or those fitting in, becalming,

always seeing both sides or taking an apolitical stance? I also looked for research on the voices of German teachers post-WWII and how they coped with the extraordinary situation in which they had to teach, but I ended up empty-handed. Sadly, it seems that the stories of these teachers have by now died with them. However, several authors have written specifically about activist teaching, also with respect to climate change, and below is a brief review of selected views from the literature that can provide points of reference for this study.

Climate change connects to all areas of education. However, as society still grapples with its relationship to climate science, the role of science in society and the hopes of technological fixes to our problems, science and technology teachers have been under particular pressure to make a stand. Science and technology are areas of societal doing and learning, which are both causative to the climate crisis but also central to the issue of humanity's relationship with the material world, our ontological and foundational epistemological concepts, as well as potentially remedial of the problem in the pursuit of climate change mitigation and the technological transformation towards a carbon-neutral society of the future. Bencze and Alsop (2014) edited a comprehensive book with 34 papers from academics working in education and teacher training who address the topic of *activist science and technology education*. The editors and contributors summarised their aim: "Science and technology education should be critically reworked in relation to contemporary economic, social, ecological and material conditions" (p. 10). The challenges of climate change weave through this book as a connecting thread. Below, I review some of the key ideas from the contributors to this book and their resonances with this research.

The climate emergency is provoking cognitive dissonance, as Selby (2014) argued, especially among those who perceive the gravity of the situation yet are not prepared or unable or prevented to act in accordance with it. Authenticity is central to successful teaching, and the hypocrisy of the problem perception combined with a lack of personal or institutional climate change action has "profoundly unhealthy ramifications for both the individual concerned and society at large" (Selby, 2014, p. 167). Consequently, education and climate change education, particularly, finds itself in a situation of cognitive dissonance, contradictory aims, and "cultural pathology" (Selby, 2014, p. 165). The stress shows in some teachers' choices, who leave their jobs in education to join climate activist groups (Staufenberg, 2019). One of the study participants eventually quit his job at a school that did not permit him to engage in climate change activism and started work in a different school (Everth & Bright, 2022).

For the participants of this research, denial, cognitive dissonance, and hypocrisy emerged as central issues, and, as Selby (2014) stated, the resulting "cultural pathology" (p. 165) extends to the

proponents of education for sustainable development themselves. Selby (2014), citing Macy and Young Brown (1998), highlighted that we are collectively and individually predicated and addicted to the spoils of the growth economy, a system that is on an exponential track to self-destruct but gives us the illusion of power. Selby (2014) argued that it would require a "radical personal and societal change to stave off the worst effects of climate change" (p. 167). Yet such radical change is neither occurring nor publicly promoted and generally not lived even by those who are fully conscious of the predicament. Selby (2014) said that, consequently, we are living in the form of "self-deceptive or furtive denial characterized by fully conscious or threshold of consciousness dissonance between perception of problem and identified acted upon (or not acted upon) remedies" (p. 167). In particular, this affects climate activist teachers and is causing mounting pressure on them.

A different radical approach questions the sustainability narrative as such. Rather than attempting to reach a world of sustainability defined from the outset, Blades and Newbury (2014) argued that we should let go of the sustainability concept. The authors explored how shifts in our ontology can "substantially alter power relations" (p. 184) and state "deconstructing the discourses of sustainability begin to reveal opportunities for other ways forward in the move from technical-rational fixes in favour of ontological approaches to change" (p. 184). Instead of solution-oriented approaches, the authors aimed for an *action-oriented* approach that asks *how* questions rather than *what* questions and seeks to "*elicit* the just and equitable world we are seeking" (p. 197) rather than defining it from the outset and attempting to produce it. This relates directly to Deleuze and Guattari's focus on immanence and the stance of their nomadic war machines that can elicit what is immanent rather than artificially constructed. To paraphrase Blades and Newbury in the concepts of Deleuze and Guattari, we need to deterritorialise the sustainability talk from its capture by neo-capitalist growth agendas and the idea that sustainability means a continuation of the growth predicated quo status by other means through sustaining the capitalist machine that is responsible for devouring the planet and its ecosystems. Paraphrasing Adam et al. (2019), we need to unlearn what sustainability means before we can authentically engage with the wicked problem it presents. Teacher activism for sustainability must be prepared to analyse the sustainability concept critically.

The development of activist agency is often coupled with experiential events through which concepts find expression and become real. With a lens on *events* in activism, Roth (2014) sketched a "post-constructivist perspective on activism, science education as/for socio-political action, and the associated ethicomoral dimensions" (p. 239). Roth pointed to the capacity for developing agency in students through participating in events and activities that promote environmental engagement. Roth also stressed the ethical imperative of the precautionary principle against which the plausibility of the

activist stance must be measured. Ethical activism relies on well-informed individuals, as Elshof (2014) stated, who understand how the 'real world' works "in all its political, cultural and ideological diversity" (p. 325). Elshof wondered about education and asked, "what exactly are we preparing them for?" (p. 324) if we are not helping them to develop a science and technology-based activist stance in society. He argued that activism begins by "disclosing power as a precursor to activism in the public interest" (p. 323). Elshof commented that teachers' activism that leads to student activism elicits abusive "howls of indignant complaint" (p. 325) by the neoliberal right, charging teachers with indoctrination.

> *I am all too aware of this. I was the target of such abusive commentary by right-wing pundits in our town after assisting students with their relatively modest activism during the 2019 student climate marches (Brickell, 2019).*

Elshof then pointed, like some of the other authors in the book, to the "awakening of dissonance" (p. 324), or perhaps wakening *to* the cognitive dissonance, which, as Elsof thought, is essential to enable activist engagement that is informed by "science, ethics and justice" (p. 326).

Resonating with the theme of cognitive dissonance, Houwer (2014) alluded to the "pedagogical cognitive dissonance" (p. 119) that crises and the awakening to our beliefs and normative structures produce, the dissonance between knowing and doing. For Houwer, crises are pedagogical opportunities as much as opportunities for change. The climate crisis is the fundamental crisis of our society with regard to our arrangement with the living planet. It is also a fundamental educational opportunity. It is a crisis, as Houwer (2014) stated, in which our "normative conventions" (p. 116) of the past are challenged. Concerning ontological positions, I would point out that the humanist paradigm is centrally challenged here. This points again to the importance of the ontological turn to matter in this context. Houwer (2014) argued that "regardless of how we choose [to respond], [the] crisis has made us agents" (p. 116). In a way, the climate crisis is turning all of us into agents, irrespective of our roles. The agnostic or the denier, the assuager and the neoliberal politician are all agents within the climate crisis. The challenge for the activist teacher, Houwer stated, citing Ruitenburg (2005), is "to access but not foreclose the crisis, and on the other hand contain it [such that it is not more] crisis (sic) than the class can sustain" (Ruitenburg, 2005, cited in Houwer, 2014, p. 119). Indeed, the sustainability of messages of climate doom is in question, and eco-anxiety is becoming a growing concern for activist teachers (Plautz, 2020).

2.4.2 Flipping the System

In this research project on climate activist teachers, teacher agency, autonomy, and professionalism come into focus. What is the educational environment in which this climate activism can play itself out? School systems can have disabling or enabling properties for teacher activism. In my experience teaching since 2012 in schools in Aotearoa, predominantly in the senior years, teachers are hamstrung by the National Certificate for Educational Achievement (NCEA) achievement standards structure mandated by the New Zealand Qualifications Authority (NZQA) and the resulting limitations of the timetable with regard to implementing climate education into their curriculum. While Aotearoa has a very general and open school curriculum (MoE, 2007), this curriculum document takes a back seat in secondary schooling when it comes to teaching and learning design due to the foregrounding of credit gathering based on the NZQA/NCEA goalposts. I have significantly expanded on this problem in a recent paper (Everth, 2022b).

The book *Flip The System*, edited by Evers and Kneyber (2015), offers perspectives and suggestions to enable and promote teacher activism. The authors advocate flipping the power structures of the education system to put teachers at the top of the decision-making pyramid. The book starts with a lament of the neoliberal attempt to instrumentalise education through a focus on "accountability, privatisation and control" (p. 9) into a top-down organized enterprise that has the replication of the current neoliberal ideology and economic order as its goal. As the authors found in their introduction, neoliberalism discovered an education crisis in the 1970s and 1980s: a perceived lack of accountability of teachers and schools, who were operating in a trust model without much external accountability. Fear of being taken over by the regimented and rote-learning-oriented Asian education models might have been the source of these concerns. The authors pointed to Aotearoa and the government's *Administering for Excellence* (New Zealand Taskforce to Review Education Administration, 1988) and *Tomorrow's Schools* (Reform of Education Administration Charters Working Group, 1988) reports and the normative international pressures raised through the comparative PISA surveys (OECD, 2007).

Due to the drive for accountability, neoliberal educational reforms permeated many jurisdictions over the last decades. Evers and Kneyber (2015) pointed out that education is costly, and taxpayers and governments want value for their money. This value is seen from the perspective of neoliberal capitalist governments in the production of individuals who are adaptable to the modern agile working environments, are highly productive and skilful, and are willing to become the cogs in the gear of the neoliberal industrial machine. In short, from this perspective, education should produce individuals who are tested against set standards that accredit them as reliable, competitive

contributors to the growth economy. The rise of private and charter schools is part of this development in which parents and students become *customers* who *buy* an educational outcome. For New Zealand, the NZQA/NCEA system of achievement standards at secondary schools became a tool for accountability, measurability, and normativity. It is today the dominant driver of the enacted curriculum in secondary schools in New Zealand and the single most limiting element in the education system concerning teacher choice of curriculum interpretation, the design of relevant learning content, and the engagement with material not directly linked to credits and standards. Evers and Kneyber (2015) paraphrased Biesta's comment about the "death of the teacher" (p. 3) and decried that the neoliberal reforms questioned the professionality of the teaching profession and the idea that teachers have a meaningful voice or much to contribute.

In reference to Katzenmeyer and Moller (2001), Evers and Kneyber (2015) evoked the image of the collective of teachers as a 'Sleeping Giant', waiting to be awoken to their full potential to contribute to social change. Evers and Kneyber stated that "*every* teacher should attempt to impact in and outside of their classroom, to identify with and contribute to the community of teacher leaders, to influence improved educational practice and to accept responsibility for achieving the outcome of their leadership" (p. 6). Evers and Kneyber said that getting there should be a process of emancipation instead of system intervention. To accomplish this, the authors suggested teachers should act as professional equals, refuse and interrupt the powers within the system if needed, and lay claim to "positions and discretional space that they have not previously been entitled to" (p. 7).

It would seem that climate activist teachers, in particular in Aotearoa secondary schools, where the narrowly focussed NZQA/NCEA system constrains much of, if not the entire year, would wish we had the flipped system as Evers and Kneyber envisaged, allowing meaningful bottom-up curriculum initiatives to evolve. Regarding the neoliberal drift and the "death of the teacher", as presented by Evers and Kneyber, parallels can be found in a review of Aotearoa education reform. In a paper on *Educational Reform in New Zealand: contesting the role of the teacher,* Gordon (1992) pointed out a very similar view: "The central argument is that the educational reforms, which have been informed primarily by neoliberal views of the role of education and the state, have aimed to remove teachers from their professional role in all aspects of the education system and to proletarianise them into a reduced role, merely as classroom teachers" (1992, p. 23). Codd (2005) added very similar observations with regards to the neoliberal reforms of the 1990s in Aotearoa and the shift from teachers' professional autonomy to becoming "managed professionals" under the growing influence of neoliberalism.

2.4.3 Climate Change and the Purpose of Education

The climate emergency questions the core purpose of education as a system of cultural reproduction. In our paper (Everth & Bright, 2022), we refer to Nash (1990) and his discourse of Bourdieu's extensive work and theorising on cultural reproduction through education as a "conservative force" (p. 435). With climate change being a product of the dominant world culture, culturally reproductive education cannot continue unchallenged. As Webb et al. (2020) pointed out in their review of Bourdieu, education is a tool for generating and reproducing the dominant culture and its interests. Webb et al. state that "something becomes 'culture' because it is in someone's (or some institution's) interests for this to be so" (p. 155). Brulle and Norgaard (2019) argued that the dominant culture in society responds with "inertia regarding climate change at individual, institutional, and societal levels" (p. 886) to avoid the cultural trauma and the large-scale efforts required to affect the necessary change. The authors also analyse that a standardisation of institutional systems and practices stands in the way of change. This is especially pertinent to the secondary school education system in Aotearoa, where the standardisation of assessments and learning generates significant inertia and resistance to change by individual schools and teachers. In the language of Deleuze and Guattari, institutional assemblages and their territorialisation are significant hindrances of agile change in response to the climate emergency (Everth & Bright, 2022).

Questioning the purpose of education in light of climate change, Irwin (2020) wondered if education should now pivot away from its role of cultural reproduction and instead assume the "driving seat of cultural transformation"(p. 494). Irwin suggested, and I would readily agree, that tertiary institutions and teacher education will have a crucial role in questioning education's purpose. Resetting society's norms, Irwin stated, "amounts to a profound shift in the cultural reproduction that is the special responsibility of education"(p. 494). Paraphrasing Irwin, I argue that to achieve this, teachers will need to become climate activists, *agents provocateurs* and Deleuze and Guattari's nomad war machines at all levels of the education system for education to be able to enable education's role in the transformation of our society towards a post-carbon world. Climate change is a global issue that raises global equity and responsibility questions. Irwin (2020) asked if, in this global context, our concepts of "civic education" and their drivers are still fit for purpose (p. 494).

Responding to the challenges of education to urgently adapt to climate change, Irwin (2020) argued that education will be "unable to meet its task of knowledge transfer" (p. 492) unless it embraces and is up-to-date with climate change. As an aside, it is remarked here that education in these times must accomplish vastly more than the transfer of knowledge. While knowledge transfer is always an essential element of education, in our time, education must map out entirely new

territories for which knowledge is not yet available to be transferred but is generated in the progress of walking into the uncharted times ahead. We are entering a remarkable time when students, teachers and all of society need to learn and discover new ways of understanding the world, what it means to be human, and how to share this planet collectively and sustainably with the rest of the biosphere.

Curriculum delivery is undoubtedly one fundamental purpose of education. However, in times of rapid change, can the curriculum be adapted in time for formal curriculum-driven education to respond? Climate activist teachers are bound to feel constrained by state curricula that exclude the critical education required to tackle the root causes of climate change. Irwin (2020) speaks about the "overt and hidden curriculum of educational institutions" (p. 493) and how the climate question impacts these. It is interesting to note that the idea of an overt versus hidden curriculum hints at some of the cognitive dissonances inherent in education generally. With respect to climate change, these dissonances are vastly amplified, not only by the climate question but by the mismatch of society's carbon fuel predicated lifestyles and the educational messages of the climate emergency. Modernity, Irwin argued, is "inextricably entwined" (p. 493) with fossil fuels and climate change, and "the hidden curriculum is firmly enmeshed in the values and practices, the 'habitus' as Bourdieu put it, of fossil-fuel-based modernity" (p. 493). Irwin pointed out that the climate crisis has hardly affected our schools' overt curriculum despite some students engaging in climate marches. She asserts, linking back to the issue of authenticity, that most teachers do not know how to tackle the climate emergency in their work "because it's a question that challenges our known way of doing things" (p. 493). In other words, our "deeply problematic metaphysical assumptions of modernity" (p. 493) are challenged to the core by climate change. As Irwin stated, we are not equipped nor experienced to think appropriately through this crisis nor be the instigators of necessary change. We must first "have established our own unconscious bias about reproducing the status quo" (p. 493) to embark on the quest for a climate-friendly curriculum.

2.4.4 Climate and Authenticity in Teaching

Authenticity is an empowering ingredient of successful teaching praxis and promotes student learning (Kreber et al., 2007). I argue that for climate activist teachers (CATs), authenticity regarding society's position on climate change will be essential and challenging and is one of the critical issues they are facing. It is deeply connected to, and generative of, forming a healthy teacher identity and is at risk due to the significant potential for cognitive dissonance inherent in the climate issue. Authenticity is also generative, I argue, for teacher empowerment and the power of activism.

Summarising common conceptions of what authenticity means, Kreber et al. (2007) stated, “It makes individuals more whole, more integrated, more fully human, more aware, more content with their personal and professional lives, their actions more clearly linked to purpose, ‘empowered,’ better able to engage in community with others, and so forth” (p. 24). Based on empirical research on authenticity as an ingredient to transformative learning, Cranton and Carusetta (2004) defined authenticity as “being genuine, showing consistency between values and actions, relating to others in such a way as to encourage their authenticity, and living a critical life” (p. 7). Paraphrasing Cranton and Carusetta: to be authentic, teachers’ behaviours should be congruent with their words, and teachers should practise what they preach. Cranton and Carusetta noted the position of Jarvis (2011) in stating that teacher authenticity entails that they are learning and growing together with their students. Quoting Sharp (1995), Cranton and Carusetta highlighted that authenticity also entails individuation and a “segregation of the individual from the undifferentiated and unconscious herd” (Sharp, 1995, as cited in Cranton & Carusetta, 2004, p. 8). An authentic educator “is bold, dares to take risks, and recognizes that he or she will not always win over the people” (Cranton & Carusetta, 2004, p. 8). Deleuze and Guattari’s nomad war machine concept appears to correspond with these qualities.

As long as society and our governments are slow to progress with effective climate action, climate activist teachers will feel isolated, and their authenticity may suffer in the view of their students and society due to the system's constraints. The question that Cranton and Carusetta (2004) asked in a general way in their research offers itself here to be asked as part of this research on CATs: What does authenticity in teaching the climate emergency look like, and how do CATs see it manifest in their teaching praxis? The authors remark that authenticity has been a neglected area of study. For CATs, the authenticity perspective is an important aspect of this research. Teachers need to look inward, as Cranton and Carusetta (2004) said, to “examine how it is that they as social human beings and individuals can develop their own way in the world of [climate change] teaching” (p. 21).

2.4.5 Climating as Entanglement

The literature on post-humanism is predominantly written from the perspective of the critique of the humanist legacy in all its forms, with the addition of affirmative ethical praxis as a pointer to future developments. It is, therefore, interesting to read a constructive report on the application of Barad’s (2007) agential realism on enacted climate education and the pedagogy that inspired it. Such a contribution can be found in the work of Verlie (2017, 2019; 2018), who undertook critical action research on climate change education based on her new materialism-inspired theory as the tutor of the *2015 Climate Change Responses Course* (CCR15) at RMIT. Her underlying theory was influenced,

in particular, by ideas drawn from Barad's (2007, 2014) agential realism, but also by the feminist theories of Neimanis and Walker (2014) and Spector's (2015) theory on diffraction as a pedagogy. In her paper *Rethinking Climate Education: Climate as Entanglement* (2017), Verlie proposed a climate education that pedagogically "moves us from knowing about climate—which implies a disconnected knower and a static world—to diverse, worldly practices of climating and becoming-climate" (p. 560). Verlie's argument for a new materialism-inspired climate education arises from her realisation of the shortcomings of simply stating that climate change is human-induced. In Verlie's view, this reinforces a human-nature dualism that separates us, the "climate knowers from the climate" and asks, "how do we enable students to know climate change objectively, without resorting to the human/nature dualism" (pp. 561, 563)? Verlie (2017) continued:

> As a climate educator and activist, I believe that our approaches need to do far more than fight fiction with facts. We need to consider our relationships with climate much more seriously than a yes/no, right/wrong approach affords. As we say good morning to the Anthropocene, we need to radically interrogate our understanding of climate, humanity, and their intra-relationship. (p. 561)

A key to Verlie's approach to her climate change education is Barad's (2007) concept of entanglement, which is not just "any old kind of connection, interweaving, or enmeshment in a complicated situation" (p. 160). Verlie followed the metaphysics of Barad (2007), who argued that entanglement erases the notion of independently existing relata at the quantum level that underpins all of nature's phenomena. Verlie (2017) extended the notion of entanglement to the discourse of the social versus nature. Objectivity, Verlie stated, arises in Barad's account "by taking phenomena [entanglements] as the primary ontological units, rather than preindividuated entities" (p. 564). Verlie's (2017) stated:

> Climate as entanglement accounts for how climate science works, without conceptualizing humans and the climate as independent entities that preexist their intra-action. This is intended as an opening, a call to rethink the philosophy of climate science as it informs the ontologies and epistemologies of our pedagogies. (p. 569)

In working towards her climate pedagogy, Verlie (2017) suggested thinking of climate as a verb, not a noun, a process of 'climating' in which humans, culture, and nature enact their mutual entanglement: "Climate education could be understood as processes of becoming-climate, referring to the differing subjectivities and relationalities that emerge through practices of climating" (p. 570). With respect to Verlie's reliance on entanglement and the non-existence of pre-individuated entities, I refer to decoherence theory and our critique of Barad's theory (Everth & Gurney, 2022) and the importance of realising that the phenomenon of climate change is evoked through existing entities, such as fossil

fuels, physical laws, and the energy-hungry techno-civilisation. The agential relationships between these factors are not based on quantum mechanics but on power, economics, and the resonances between the possible and the desirable in the emergent classical reality. Referring to quantum phenomena such as some form of quantum entanglement risks projecting fundamental physics without justification into the realm of ontology at the human and political scale, which is dominated by decoherence and the classicality of entities and their interactions (Hoefer, 2020; Holzhey, 2021).

Verlie's pedagogy connects students and teachers with the emotions of fear, anger, hopelessness, and despair that arise once the gravity of the human-caused climate crisis and its consequences for the planet, its species, and the future of humanity sinks in. I argue that it is imperative to educate society about the gravity of climate change to affect sufficient action. However, deep emotional immersion in the climate change problem can send informed individuals into a state of powerlessness, profound grief, and even despair, which can become a "barrier to environmental engagement" (Li & Monroe, 2019, p. 936). This is a classic ethical dilemma. Is catastrophism useful or even necessary to awaken individuals and society to the gravity of climate change and affect action to overcome the "commons dilemma" (Aitken et al., 2011) that climate change constitutes? Or does catastrophism result in psychological damage to individuals and a depressed and powerless society that loses the will to fight for a better collective future?

Teachers are in a particular predicament: How should we entangle the students with climating to promote agency? Simone Weil (2000) wrote, "The notion of obligations comes before that of rights, which is subordinate and relative to the former. A right is not effectual by itself, but only in relation to the obligation to which it corresponds" (p. 86). Is the obligation to preserve the planet in a habitable state more pressing than the right to be shielded from potentially emotionally harmful climate change representations? Verlie (2019) confronted this ethical dilemma head-on in her work and analysed these "characteristic emotional encounters in CCR 15" (p. 171) of anxiety, frustration, overwhelm, guilt, grief, and hope comprehensively. In a discourse on hope, Verlie (2019) recognized this emotional work as necessary to process grief and respond effectively. "And if we cannot respond effectively, *then* there is no hope" (p. 183). Positive narratives focusing on the significant benefits of a transition to a sustainable future may be among the most empowering educational tools available.

2.4.6 From Climate Despair and Eco-Anxiety to Hope

For a growing part of the population across all ages, climate change is causing despair and hopelessness but also feelings of guilt, anger, and grief. For education, climate anxiety, hopelessness, and the mental health impact this generates are of significant concern. As Colebrook (2020a) argued, the future is already deterritorialised due to the Anthropocene predicaments, and people are

becoming virtually homeless by losing confidence in the mental images and virtual territories in which they saw their lives play out. A fast-growing body of research provides compelling evidence of the seriousness of this issue, including impacts on functions in daily life (S. Clayton, 2020; Heeren et al., 2022; Pihkala, 2020, 2022). People who have been affected by severe climate-related events such as fires or floods show signs of post-traumatic stress disorder (PTSD) and are especially vulnerable to mental distress, but as Clayton (2020) reported, even "slow, gradual environmental changes have significant effects" (p. 1).

However, it is not only first-hand experiences with severe climate impacts that are generating PTSD and emotions of despair, but eco-anxiety is also arising widely among people who merely contemplate the severity of climate change and the potentially catastrophic damage to the environment it may cause. Clayton (2020) emphasised the importance of understanding this connection because it could affect anybody who knows about climate change, especially people who care deeply about the environment. However, as Clayton further pointed out, it is important to understand climate anxiety not as pathological but as a reasonable response to the crisis, even though it can evolve into a chronic clinical presentation that affects wellbeing and general health. Climate anxiety is a strong motivator for behavioural change toward climate change mitigating actions. Clayton (2020) reported from a study undertaken by the American Psychological Association that "people who reported 'eco-anxiety' were more than twice as likely (87 %) as those who did not (40 %) to say that they are motivated to change their behaviour in order to reduce their contribution to climate change" (p. 4). The participants in this study reported on student anxiety, their own despair, and the challenges they faced, as discussed in the findings chapters below.

Navigating the problematic pedagogical spaces between raising knowledge and awareness, risking the production of fear and despair, generating hope and evoking agency and ambition for necessary change is challenging for education. Education is a collective undertaking, and as Nairn (2019) argued, the collectivisation of despair and hope is of particular importance at this time so that students do not feel left alone with the burden of climate change. Nairn pointed to the catalytic function of hope for the generation of agency. Citing Harris (2017), Nairn reflected on the discursive double-sided nature of trouble and excitement and the release of energy in times of crisis, where 'change is in the air', and hope emerges not despite of but because of adversity and the 'call to arms' it generates. In the liminal space between hope and despair, Dodds (2011) pointed to the suicide motive in popular end-of-time fantasies in movies and literature and the mixture of enthrallment and horror of envisioning a world that radically changes and evicts humans. Imagining a world without us,

as Dodds argued, can become a coping strategy. Dodds warns of “manic hope leading to short-term activism which collapses when change is not rapid enough” (p. 44).

This remark is of particular interest in education. Climate change itself is rapidly advancing. However, climate change mitigation is a long-term project with compelling evidence for success likely remaining elusive for decades to come. Evoking hope in the context of education, therefore, risks generating unrealistic youthful expectations and manic activism, which runs the risk of being frustrated without making notable change. Participants in this study remarked on this complex matter. For teachers themselves, the collectivisation of despair and hope Nairn (2019) talks about is particularly important. So far, only a small fraction of teachers are actively involved in climate change education. It is not surprising that many of the study participants reported loneliness in their school staffroom. For them, the collectivisation of their emotions was not possible in the circumstances of their work.

2.5 Summary: Critical Pedagogy in Uncertain Times

Responding to climate change means responding to the domination by the culture that is still amplifying its growing impact. Paraphrasing Freire (2000), oppressed by the agential relationships of the capitalist machine, people “are inhibited from waging the struggle for freedom so long as they feel incapable of running the risks it requires” (p. 47). The risks of disturbing the mechanisms of our fossil fuel energy-predicated economy appear more real to many than the risks of an insurmountable environmental catastrophe in decades to come. Freire then stated the central problem for education: “How can the oppressed, as divided, unauthentic beings, participate in developing the pedagogy of their liberation?” (p. 48). Education, as Mayo (2020) stated, has a dual capacity. It “can be regarded as serving to ‘domesticate’ and strengthen the status quo and therefore keep in place much of the frequently perceived ills, economic, social, and environmental” (p. 35). But it can also become an instrument of liberation and contribute “to the ushering in of a new world in which principles of social justice and ecological sustainability are held uppermost” (p.35). In the balance between the traditional objectives of education and the potential to usher in a new world, Deleuze and Guattari’s new Earth and new peoples, teachers are challenged to unfold their potential as change makers, intellectual nomads, and the Nomad War Machines Deleuze and Guattari conceptualise.

The fundamental threats of climate change and looming environmental catastrophes are compounded by the rising privatisation and commercialisation of the commons and the individualisation of what used to be common public goods and services. Mayo (2020) argued that critical pedagogy must tackle centrally with the questions of politics and power and the oppression of

people and ecology by capitalist greed and become an antidote to neoliberal market doctrines. Referring to educational sociologist Roger Dale, Mayo (2020) pointed to the role of education in promoting the narrative that social inequality is not "endemic to the system but a consequence of our different 'abilities,' and the production of necessary 'human capital' for national and global economic ends" (p. 36). Mayo argued that critical pedagogy can uncover the ways in which dominant educational philosophies underpin the "hegemonic apparatuses for the 'integral state.'" (p. 38). With respect to climate change, the perpetual growth mantra of the current economic paradigms becomes the focus of critique. Because it is the predication of the current global economic system on a growth dynamic that is fundamentally incompatible with our one-planet reality. How else could the colossal personal and national mountains of debt remain sustainable, but with reference to the mythology of growth and future riches? However, theories of how the state apparatus could be revised to manage a necessary radical degrowth trajectory are so far underdeveloped (D'Alisa & Kallis, 2020).

Concerning a future of living safely within the global ecological limits, critical education today is like Deleuze and Guattari's nomad wandering into a land not yet seen and walked upon. This is unlike the situations in past episodes of critical pedagogy engaging with questions of social justice and liberation from oppression, where historical and geopolitical references to other societies provided reference to solutions. Solving the Anthropocene predicaments is an unexplored territory in all respects. Mitigating the planetary climate change trajectory cannot be accomplished locally but must be a global effort. Therefore, developing the critical pedagogy required to lead society will need to be a global undertaking. The need for degrowth coincides with the need for education about social inequality. Perkins (2019) argued that "[e]conomic inequality reduces the political space for addressing climate change, by producing fear-based populism" (p. 183). Critical pedagogy in the age of climate change must, therefore, be both a pedagogy of the economically oppressed humanity and a pedagogy of the liberation of the more-than-human world from the oppression by the Anthropocene. It must become a post-humanist critical pedagogy. Education's traditional business is to aid the reproduction of culture and to celebrate human expansion with every child. Yet, education must question its reproductive practices (Pedersen, 2010) and confront its central role in perpetuating human expansionism. As humanity shrinks back into ecologically sustainable bounds, education must come to terms with degrowth. In many countries in the affluent West, birth rates are falling, and even the population of China has entered a phase of decline in 2023. In every child that is born lies a dormant demand for resources that the planet may no longer be able to deliver sustainably, but also, in every child that is born lies the hope for change and a better world. Which of the two will be drawn out by the practices of 'educare' will depend on the deliberate actions of educators and the education system. We need to save the world both from and for future humans (Pedersen, 2010).

The theory and literature traversed within the rhizome in this section started by unpacking Deleuze and Guattari's conceptual tools and instrumentalising them for interrogating the psychological conditions of society that generate and maintain self-destructive socio-political structures and habits. Following Deleuze and Guattari's concepts, arguments for a pragmatic critical realist ontology were promoted, an ontology of immanence that accepts the reality and agency of the material world, independent from and unimpressed by human discourse. As MacLure (2017) so aptly stated, "discourse does not discipline matter" (p. 7). It was also argued that the idiosyncratic interpretations of quantum mechanics by Barad (2007) cannot reconstitute visions of an indeterminate macroscopic reality awaiting to be lifted into fleeting moments of existence in specific interactions. In fact, as we argued (Everth & Gurney, 2022), the classical material world and its dynamics are instantiated through the perversive random entanglements of matter in the cosmos with the totality of itself as environment, as described in the work of Zurek (2021) and others. Reading climate science with a pragmatic realist ontology leads to taking the predictions of climate science seriously and engaging with the implications this entails in a realist composure.

Pragmatic realism reveals that Humanity stands at a critical juncture. Due to our actions and omissions, the ecosystems of Earth that predicate our existence are being pushed onto a trajectory toward irreversible species extinctions, habitat destruction and global environmental degradation. Climate change is arguably the most pressing symptom of the planet's reaction to human impacts and is currently the most visible driver of the extinction dynamic humanity has unleashed.

I argue that education has a crucial role in moving humanity forward through the difficult times ahead and that adjusting to a life that is befitting to the planetary boundaries constitutes an unprecedented educational challenge. Succeeding in this task will depend on unleashing, inspiring and guiding human agency toward overcoming the oppressions that keep society locked on self-destructive trajectories. Teachers tasked with conceptualising and delivering the required education must develop a deep understanding of the complex and interlinking socio-scientific issues involved.

Today's climate activist teachers are a bellwether for probing the challenges teachers face and the desires that motivate their engagement. Using the concepts of Deleuze and Guattari, teachers were then viewed as potential nomad war machines, change makers, travellers, interpreters, and messengers within the deeply territorialised geography of the social/material reality. Deleuze and Guattari's new Earth and new peoples can be evoked and brought from the virtual to the actual reality through education and teachers' actions.

3 RESEARCH APPROACH AND IMPLEMENTATION

3.1 Overview

This research undertook a longitudinal critical ethnographic study over the course of one year with seventeen Climate Activist Teachers (CATs) in Aotearoa to investigate the following research questions:

- How do Climate Activist Teachers perceive themselves, the education system, and their role as educators with respect to the climate emergency?
- What are Climate Activist Teachers' desires for changes to the education system in response to the climate emergency?

A diverse group of participants (n=17) self-selected into the study through advertisements on social media channels frequented by teachers concerned with current ideas in education, environmental education and climate change. The advertisements targeted high school teachers and educators involved in teacher training or support. All engagements with the participants were conducted digitally, through distance interviews via Zoom, structured online questionnaires, and email, including the digital exchange of assemblage drawings produced by the participants, which were used in follow-up explorative interviews. A grounded theoretical approach was applied to allow the data from initial extended and unstructured interviews to guide the iterative evolution of the theoretical framework and the conception of further engagements with the participants. During the one-year-long data-gathering phase, deepening engagement with the concepts from the writings of Deleuze and Guattari gained influence on the methods of inquiry, the analysis of the data, and the discussion of findings. All interviews were recorded, transcribed, and thematically analysed in successive and iterative cycles of analysis, theorising, thematisation, interpretation, and further participant engagement.

This chapter starts with a review of the research approach and the philosophy that inspired it. This is followed by a description of the implementation phase of the research and the methods used for the data analysis. The chapter ends with a discussion of ethical implementations and limitations.

3.2 Approach

3.2.1 Pragmatic Realist Paradigm

A pragmatic realist paradigm based on Deleuze and Guattari's ideas and ideas from New Materialism, as described and justified in the previous chapter, informed the theoretical understanding of the

climate emergency and inspired the approach of this research. New materialist literature on approaches in social research, such as Fox and Alldred (2016), Marn and Wolgemuth (2017), MacLure (2017), Schadler (2019), Feely (2019), Hickey and Moody (2018), informed the initial approach for this research. Adopting grounded theory (B. G. Glaser & Strauss, 2009) allowed the research to remain responsive to change as it progressed. The deepening engagement with Deleuze and Guattari's ideas during the research's initial phase inspired participant engagement and data analysis. The ideas of Deleuze and Guattari are increasingly being taken up in practical research across the social sciences. Coleman and Ringrose (2013) pointed out that the growing destabilisations of society due to the Anthropocene deterritorialisations motivate researchers to "break out of methodological/disciplinary 'territorialities'" (p. 2).

The new materialism approach in research focuses on the *enactment* of a relational paradigm that asks *how* realities are *generated* or *constituted* through the relations and intra-actions (Barad, 2007) of the components in the *research assemblage* (Fox & Alldred, 2015b, 2016, 2021a). This approach corresponds to the dynamism and temporality of matter's agency (Hickey-Moody, 2018) and the assemblage analysis of narrative data (Feely, 2019). The concept of the research assemblage describes the mutually diffractive coming-together of the research components involved in generating the phenomenon of the captured data.

The new materialist turn in social science has shifted concerns from the epistemic to the ontic space and questions about the agential relational processes that generate phenomena and their agential productive capacities. The principles of new materialist methodology, according to Fox and Alldred (2016), are:

- an ontological orientation towards matter (as opposed to textuality or structures);
- a concern with what matter *does* [emphasis added], not what it is;
- a post-anthropocentric focus on the capacity of all matter (not just human bodies) to produce affect and be affected;
- acknowledgement that thoughts, memories, desires and emotions have material effects and are emergent from and embodied through configurations of matter;
- power (and resistance to it) operates at the very local level of actions and events, rather than top-down; and
- sociology is itself part of the materiality of the social world.

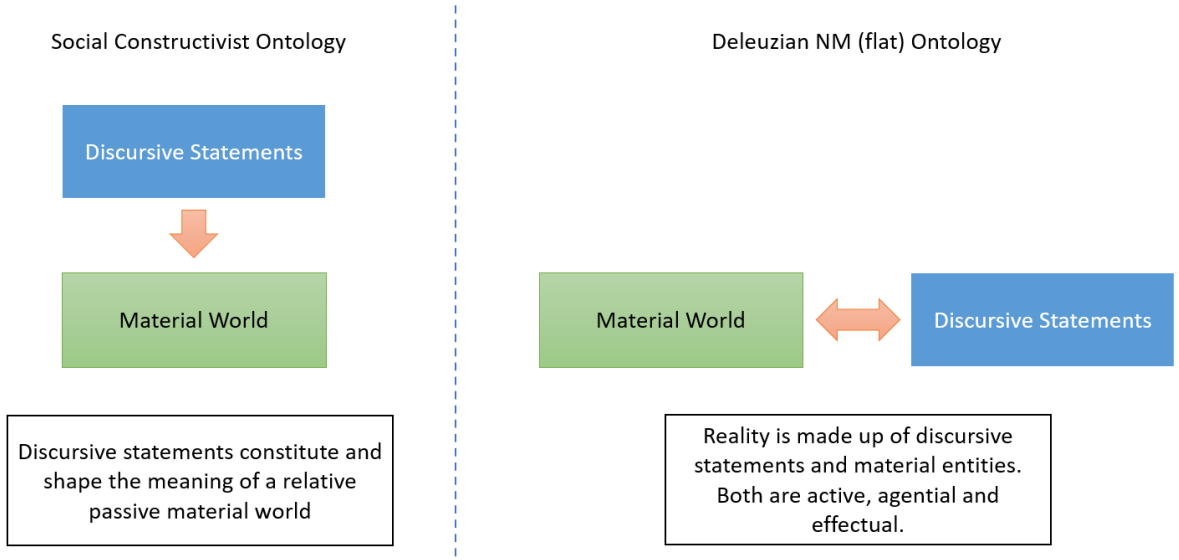
(p. 153)

Fox and Alldred (2016) argued that new materialism's flat ontology "undermines structural or systematic explanations of sociological data" (p. 154), and, as Fox and Alldred (2015b) state, "de-

essentialises events, taking an assemblage's emergent capacities, fluxes and becomings as its objects of study" (p. 412). The rejection of territorialising structures as essences shifts the focus from "what bodies or things or social institutions *are"* (Fox & Alldred, 2016, p. 154) to "the capacities for action, interaction, feeling and desire produced in bodies or groups of bodies by affective flows" (Fox & Alldred, 2016, p. 154).

Figure 3-1

Ontological Concepts



Note. Drawing with reference to Feely (2019, p. 5, Figure 1). Copyright by Sage 2019. Preapproved Permission from the journal.

The flat ontology concept and its rejection of the essentiality of social hierarchies and structures is not to be understood as a perspective that denies the existence of these structures and their territorialising affects (see Figure 3-1). Instead, a flat ontology strives to deterritorialise these structures and look at the fundamental affective flows of paranoia and desire that generate them. Matter and discourse are "mutually constituted in the production of knowing in a flow of continuous differentiation" (Taguchi, 2012, p. 268). I agree with Knudsen (2023) that a flat ontology should not cloud the view of reality with respect to immanent qualities and potentialities that give rise to the emergence of phenomena, agency, and structures, nor should it be ignorant of emergent and evolved differences in enabling capacities and capabilities, or diffract reality into a diverging multiplicity. Instead, through rejecting Cartesian *a-priori hierarchies*, monist new materialist approaches aim to explain their generation without granting them essential qualities.

Central to the new materialist view of research is the critique of traditional ideas of cuts between subjects and objects, between observers and the observed, and the processes by which meaning is derived through coding, the declaration and subtraction of bias, and the framework of the pre-existing theory. However, in the view of new materialist theories, the traditional cuts no longer count as reliable. All method is performative and instrumental, and reality is enacted through the entanglement of the observer and the observed, the medium or the instrument of observation, and its methods of action. MacLure (2017) found that traditionally, in qualitative research, data remain mute and discarded after coding and are "awakened to meaning by the interpretive prowess of the researcher and her specialist analytic tools" (p. 8). What remains is not the data, but an artefact made by the researcher and cast into language, which materializes a conception of the data in the reader's mind. New materialism promises to dwell "with data's bad behaviour…; its queer agency" (p. 9). In keeping with this premise, I have maintained a strong presence of the raw data in the findings chapters, including artefacts produced by the participants.

MacLure (2017) reported of a researcher, Rachel Holmes, who kept being fascinated by a piece of video footage she watched over and over again, and where she experienced a capacity of the data to continuously de- and then re-compose the depicted event anew. As MacLure argued, the data maintained "its capacity to reach and lead beyond itself, to a multiplicity of things and ideas not-yet-named; but without losing the singularity of the data itself" (p. 10). Taking inspiration from MacLure and the work of Fox and Alldred, the participants of this study were invited to generate assemblage drawings. These artefacts are a way to represent data in their raw form and retain the capacity to entangle the viewer into a new assemblage at each viewing and demote written and spoken language as the sole mode of negotiating meaning between the data, the researcher, and the reader.

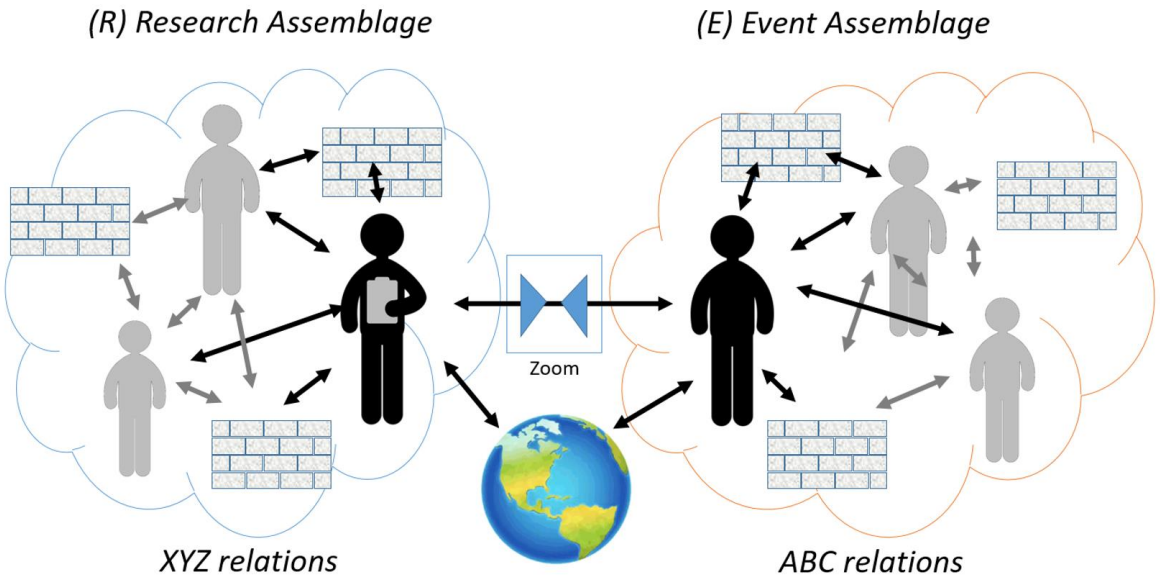
The pragmatic realist ontology (see Chapter 2) underlying this research resonates with the central issue of the climate change emergency. The material reality surrounding the social context of climate change is generating normative pressures. The greenhouse effect and the climate change resulting from human actions are not disciplined by discourse, as MacLure (2017) would argue. Accepting this is not akin to naïve realism or positivism, but, as explored at length in the previous chapter, accepting the martial reality of climate change confronts and critiques constructivist ideology and politically motivated ontological relativism.

3.2.2 Research as Assemblage

The research assemblage comprises, according to Fox and Alldred (2016), “the bodies, things and abstractions that get caught up in social inquiry, including the events that are studied, and the researchers” (p. 152). Fox and Alldred (2016) made an example of ethnographic research and proposed a materialist analysis of the research encounter that dissects a supposed ethnographic event *E* and the corresponding research assemblage *R* and its affectual relations. Figure 3-2, depicts the scenario envisioned by Fox and Alldred (2016), adapted to the situation of this research, where the Zoom meeting software is used to intra-act with the participants. The “hybrid research assemblage” (p. 157) R/E, is a complex web of intra-actions which can influence and shape the conduction of the research event and the generation of its output through analysis, representation, interpretation and the “micropolitics” (p. 157) of the research.

Figure 3-2

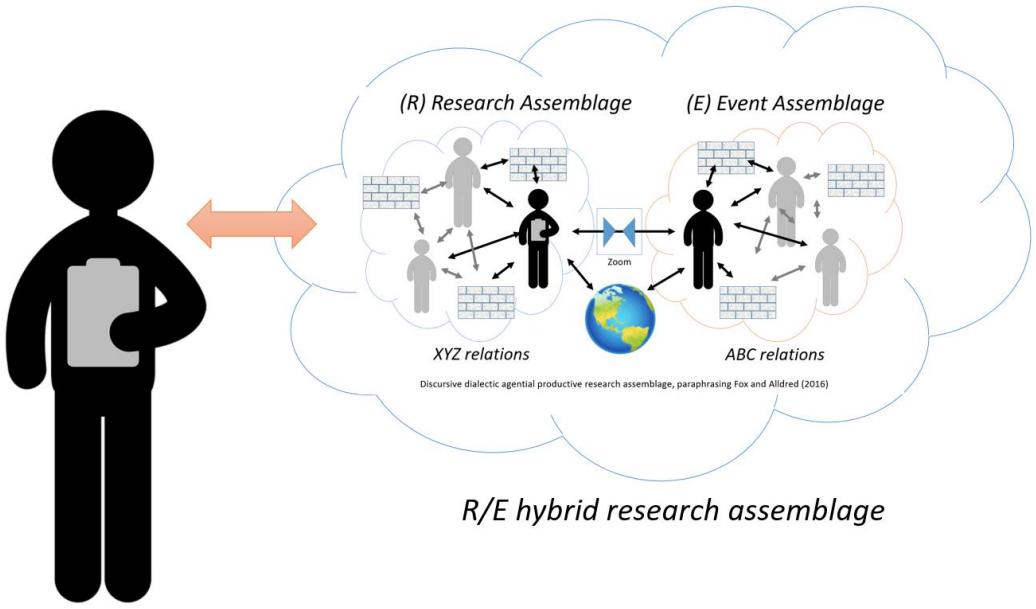
Research and Event Assemblage



Note. Research and Event Assemblage. Paraphrasing Fox and Alldred (2016, p. 157)

Figure 3-3

Hybrid Research Assemblage



Note. Hybrid Research Assemblage, Researcher in reflexive exterior and embedded interior positionality.

A hybrid *R/E* assemblage (Figure 3-3) links both E and R and creates a research process in which the researcher adopts both a reflexive exterior and embedded interior positionality. Fox and Alldred (2016) argued that the researcher can design and know the research assemblage and its XYZ relations, the "paraphernalia of academic inquiry" (p. 157), and can attenuate their impact to achieve a desired "affect economy" (p. 157), that permits the investigation of the event-assemblage and the ABC relations to produce output that becomes the researched knowledge of E. The potential relationships of the hybrid assemblage are complex and are addressed in the research analysis. It has to be understood that intra-actions between the R and the E space have a generative capacity for phenomena and the micropolitics of the research. The situation in this research using digital technology and the Zoom medium is peculiar (see Figure 3-2) for new materialist ethnography, as the bandwidth and perception-limiting and attenuating communication channel of the Zoom environment is the only direct link between the researcher and the participants.

3.2.3 Critical Ethnographic Design

As Hammersley (2018) argued, ethnography can adopt a wide range of practices, particularly in education, which troubles its often-used definition. However, Hammersley compiles a set of features common to ethnographic work, which all resonate with the aspirations of this research. relatively long-term data collection process,

- taking place in naturally occurring settings,
- relying on participant observation, or personal engagement more generally,
- employing a range of types of data,
- aimed at documenting what actually goes on,
- emphasises the significance of the meanings people give to objects, including themselves, in the course of their activities, in other words culture, and
- holistic in focus.

(Hammersley, 2018, p. 4)

Jensen et al. (2022) summarised Hammersley (2018) by defining ethnography loosely

> as a research strategy that prioritizes fieldwork-based collection of rich unstructured data through observations and accounts of participants in order to make detailed descriptions of what they do and why they do it. (2022, p. 1145)

This concise definition of the umbrella term 'Ethnography' certainly applies to what this research aimed to accomplish. The research was not limited to single encounters with the participants but engaged them in a longitudinal series of interactions over the course of a year. The longitudinal concept combined with the grounded theoretical approach allowed the design of consecutive research encounters to evolve, together with the development of the theoretical approach.

Climate change generates an imperative for substantial and rapid social change. Therefore, this research cannot remain passive; it assumes a critical stance that desires not only to describe but to get involved in the "invention or creation of the world" (Coleman & Ringrose, 2013, p. 1). In this pursuit, this research is not limited by territorialisations through traditional methodologies. From the outset, this research was informed by the researcher's experience as a teacher in the high school system in Aotearoa and the profound sense of systemic constraints enacted by the assemblage of the education system. The motivation for embarking on this research, corresponding to Anderson's (1989) view on the critical ethnographer's concerns in education, was to contribute to the liberation of teachers and the system of education from the "sources of domination and repression" (p. 254). In the case of this research, it is the territorialisations within society and the education system that hold

teachers back from addressing climate change and its root causes and questions because, as Anderson (1989) stated, of the "role of schools in the social and cultural reproduction" (p. 251). (See also Chapter 2.4, page 72 above). Part of this ethnography's critical aspect contributes to the exorcism of the ghosts of climate denialism and the social theories that denigrated climate science, amplified uncertainties and excused inaction (Hansson, 2018, 2020).

The way my critical ethnography evolved finds close resonance with Fitzpatrick and May's (2022) book on *Critical Ethnography and Education*, which was published in the year after the conclusion of the data-gathering phase of my research. As the authors imagine in their discourse on critical ethnography in education in our time, my research was "personal, embodied, located, and lived, as well as unapologetically concentrated on relations of power" (p. 1). It was conceptualised, as Fitzpatrick and May (2022) argued, to give "attention to people and environments, experience and histories, voices and the unspoken, discourse and materiality" (p. 1) as a methodology to interrogate the extraordinary challenges facing society and education in our time. This context generates "a compelling sense of duty and commitment based on moral principles of human freedom and wellbeing" (Madison, 2019, p.4, as cited in Fitzpatrick & May, 2022) for this research, in the hope to subvert structures and territorialisations that prevent a deep engagement with the root causes of climate change in our schools. Like Fitzpatrick and May (2022), I was inspired by readings of St. Pierre (2011, 2017, 2018b, 2021) to maintain a close link between research progress and theory development and to "follow the provocations that come from everywhere in the inquiry that is living and writing" (St. Pierre, 2018, p. 603) rather than to adhere to a preconceived methodological framework.

3.2.4 Positionality, Authenticity and Reflexivity

This research undertook a "descriptive, analytical and explanatory study of the culture (and its components), values, beliefs and practices" (Cohen et al., 2018, p. 292) of CATs. Before this research, I worked as a high school teacher, and I count myself as a CAT. This research was inspired by my own experience and desires and will encompass autoethnographic elements. My positionality is, therefore, primarily that of an insider (Holmes, 2020). The insider positionality conflicts with Cohen et al. (2018), who refer to Glaser and Strauss (1967) and their suggestion that "researchers should deliberately free themselves from all prior knowledge" (Glasser and Strauss, 1967, as referenced in Cohen et al., 2018, p. 291). As a member of the 'tribe' of climate activist teachers, I obviously cannot do this. Attempts to free myself from my prior knowledge and experience would be futile and counterproductive, and as Holmes (2020), with reference to Herod (1999), emphasised, positionality during research is dynamic and "will necessarily change over time" (p. 8) through contexts and research interactions. Reflexive

comments and observations on positionality will be made throughout the discussion of the methodology, the presentation of the research data and their analysis. The research method of using recorded (video and audio) interviews with the participants and the Zoom platform (see below) will allow for a two-stage approach: An authentic intra-action with the participants during the interview with no need to attend to note-taking or other technical tasks, and a repetitive and iterative review of the recording during transaction and analysis during which a reflexive stance can be adopted without impacting on the authenticity of the original intra-action.

Reflexivity, as Cohen and Manion (2018) stated, plays a central role in qualitative research and ethnography. Reflexivity is necessary due to the researcher's central position in any research. It involves the conscious interrogation and acknowledgement of the researcher's own-self and their influence on the research, the participants, and the data. Reflexivity and the documentation of the reflexive praxis are part of the process of supporting the validity of the research and the accountability of the process. However, the new materialist turn has diffracted what it means to be reflexive and produced a critique of the concept of reflexivity. Reflexivity is seen as essential from a new materialist approach, too. However, the new materialist approach operates from a critical position towards established modern ontological structures (e.g., Fox & Alldred, 2015a, 2016). The diffractions and difference-generating intra-actions of the researcher with the research assemblages, as seen from the new materialist paradigm, question what it now means to be reflexive. Haraway (2018) articulates a suspicion that "reflexivity, like reflection, only displaces the same elsewhere, setting up the worries about copy and original and the search for the authentic and really real" (p. 16). Research seeks "the authentic and really real" (p. 16) that Haraway invokes. But how can the quest for authenticity succeed when the researcher remains removed, elsewhere reflected, outside positioned, and situated in a reflexive position while what is really counting would be the researchers' authentic intra-action with the research?

A paper by Vu on *New Materialist Auto-Ethico-Ethnography* (2018) has been of interest here, in which the author explores the concepts of authenticity and objectivity in autoethnographic research from a Barad-inspired new materialist perspective. In particular, Vu explores the question of "how would a new materialist autoethnography decenter the self of the researcher and address issues of authenticity and objectivity in practice?" (2018, p. 3). Vu suggests instead to accept centrality of the self and to approach ethnography as a form of "auto-ethico-ethnography, where the self, the culture and the science of writing are all entangled into a space–time matter and decentered from the humanistic constraints of language" (p. 13).

3.2.5 Digital Tools for Ethnography in the Times of Covid-19

Early during the research design considerations, using digital communication tools for conducting the interviews, such as Zoom, was evaluated. The sudden onset of the Covid-19 pandemic then necessitated a switch to digital tools in ethnography for many research projects (e.g., Fine & Abramson, 2020; Howlett, 2022). The ubiquitous use of Zoom in education during the Covid-19 lockdowns confirmed the decision to use Zoom for all interviews. This choice was also motivated by the fact that my participants came from geographically dispersed locations in Aotearoa. Using Zoom, travel was avoided, and no prospective participants were excluded based on their location. The resulting low carbon footprint for this research seemed to be an appropriate aspiration. Zoom's use and advantages as a research tool are discussed in detail below.

Digital networks create a conduit for ethnographic research that conveys both: convenient proximity and the possibility of closeness. However, digital ethnography comes with challenges that need to be addressed. Bengtsson (2014) addressed the epistemological challenges of working in the online environment and highlighted the position of the "*researcher as embodied subject*" (p. 863). In traditional fieldwork, travelling to a particular location, the act of "entering the field, sharing the everyday, 'going native'" (p. 863), were essential aspects of the ethnographic methodology. But as Bengtsson pointed out, of equal importance should be the "travelling from" (p. 863), the leaving behind, the stepping out of the everyday environment of the researcher. *As Bengtsson emphasizes, distance is a fundamental aspect* of the ethnographic approach. In particular, distance from the ethnographer's everyday life enables the deep immersion in the world of the participants that ethnography entails. In digital ethnographies, the researcher does not need to travel from anywhere, and the process of leaving behind is not happening. Bengtsson believed this aspect is "widely ignored by current discussions in the field" (p. 863).

Bengtsson differentiated between closeness and proximity, the former being about intimacy, knowing and understanding, the latter being about "physical and temporal nearness" (p. 867). With internet technology, a new level of global proximity is generated digitally and bridges any physical distance or time zones. Closeness, however, does not necessarily follow suit. Bengtsson pointed to the dialectic nature of digital research, where the positives and the negatives of the method depend on each other and cited the Frankfurt School and Hegel's work on the "double-edged dimension of culture" (p. 867) as an example of the dialectic thinking she invoked. In this discourse, new forms of reflexive ethnography will emerge that use the closeness to the participants that the Internet conveys despite the Internet's ability to divide, anonymise, and individualise. With regard to Covid-19, we were all in this together. Working from home became common. As a researcher from home, I was ultimately

embedded in the culture I researched. Bengtsson's concerns may, therefore, not apply. Encouragingly, Deakin and Wakefield (2014) wrote that "the quality of responses gained through online research is much the same as responses produced by more traditional methods" (Denscombe, 2003, as cited in Deakin & Wakefield, 2014, p. 611). I argue that in agreement with (Howlett, 2022), this research has not been hampered but inspired by the digitally-mediated methods toward "conducting transparent, reflexive, and ethical research" (p. 399).

Fine and Abrahamson (2020) sensed that Covid-19 "provides an opportunity to work on longstanding concerns such as ethnographic transparency while simultaneously advancing innovative new styles of research" (p. 1). The authors argued that ethnography requires intimacy but does not necessitate physical closeness. The ethical challenges posed by Covid-19, such as infection risks due to travel and physical contact during fieldwork, risk putting the traditional methods of ethnography in question. Digital ethnographies, as Fine and Abrahamson suggested, "may become more influential as norms of sociability and opportunities for observation shift" (p. 4). However, the authors cautioned against assuming that digital and physical methods are equivalent or "produce similar analysis" (p. 4). For this study, the choice of a digital Zoom-based ethnographic methodology was already considered prior to the arrival of Covid-19, and the pandemic reinforced this choice. Due to the excellent management of Covid-19 in Aotearoa, the overall impacts of the pandemic on the participants in this research remained moderate and did not seem to materially affect their capacity for participation. In fact, for many teachers, working from home became normalised during these years, which meant that engagements via Zoom for this research were part of an everyday work praxis.

3.2.6 Grounded Theory: Data Evoking Resonances

In the case of this study, and, in particular, due to the chosen new materialist approach to theory, I am interested in letting the data speak without forcing them into an *a priori* theoretical rubric and permitting the theory to emerge and evolve in the analysis process. In the words of Glaser and Strauss (2009), I am interested in "how the discovery of theory from data—systematically obtained and analysed in social research—can be furthered" (p. 1). Glaser and Strauss called their empirical system of obtaining theory from the data '*grounded theory'* and based it on a "*general method of comparative analysis*" (p. 1). I also refer to the Sage Handbook of Grounded Theory (Bryant & Charmaz, 2007) and Clark and Friese (2007) for discussions of grounded theoretical approaches.

As an exemplar of grounded theory and situational analysis applied under a new materialist theoretical approach for environmental education research, I refer to Ruck and Mannion (2019), who provided evidence for synergies and tensions arising in applying new materialist theories in their research. The authors' motivation to use new materialism is reflected in my own motivation, namely

the need to re-think the way humanity is "inextricably bound up with matter" (p. 1) and to "re-frame the relationship between humans and our environments" (p. 1). Concerning the climate emergency and related approaching emergencies arising from the misalignments of the human endeavour with the material world we owe our existence to, one might rephrase St. Pierre's (2018a) hope that "[p]erhaps we could be-do-live something different" (p. 5) into: we *must* be-do-live something different, and refuse a continuation of what we do and who we are. *Imagining different*, as St Pierre stated at the end of her critique of critique, is what we need to do. St Pierre (2018a) cited Spivak saying, "what I cannot imagine stands guard over everything that I must/can do, think, live" (Spivak, 1993, as cited in St. Pierre, 2018a, p. 16). This relates to the potentially constraining impact of research planning on the outcome and to Ruck and Manion (2019), who found that advanced research planning hinders this imagining-different. The authors argued that no textbooks exist to give a step-by-step account of how to undertake such research or to answer the "perceived need among doctoral students to quickly decide upon a research design before they have fully considered how a given theory might be applied to their specific research context" (p. 3).

The choice of a grounded-theoretical approach pre-empted some of these issues, and the method of recorded Zoom interviews lent itself well to this approach. As Ruck and Mannion (2019) found, the need to continually take field notes removed them from the position as a participant in the research to a passive observer, and leaving pen and notebook behind, they could now attend more fully to the more-than-human elements of the research as an encounter in which more-than-human and embodied knowledge acts. The raw data of my research are the automatically recorded videos of the Zoom interviews, which can be replayed over and again in search for detail and in *tuning* the researcher's attention to patterns of diffractions and locating *resonances* that hint at the generation of meaning-revealing hypotheses and connections to theory. This can be done iteratively through repeated diffraction of the data and the researcher against an evolving theoretical toolkit. The emerging analytical codes become increasingly resonant with the data as the tuning of the analysis assemblage evolves. In an interesting choice of words, Ruck and Mannion state, "[t]he idea of directing one's thinking through the selected use of particular theories has clear *resonances* [emphasis added] with the 'diffractive' approach to data analysis drawn from Barad (2007)" (p. 6). The term *resonance* is used casually in new materialist literature without realizing the productive power that the concept of resonance has, at least as a logical partner to diffraction. This thought resonates with Ruck's and Mannion's citation of Springgay's and Truman's assertion that "(y)ou are not there to report on what you find or what you seek, but to *activate thought"* (Springgay and Truman, 2018, as cited in Ruck & Mannion, 2019, p. 6). In other words, to elicit and promote the development of resonant patterns of cognitive activity from the excitations of the data in the author and the readers.

Ruck and Mannion (2019) used the ideas of “concepts, percepts and affects” (p. 6) as tools to unpack their data and to understand *affect* as an emotive force within the assemblage, *percepts* as self-awareness and self-feeling, and *concepts* as a broad moniker for ideas that arise in the act or practice of a given situation. The authors reported that their use of situational analysis (SA) based on maps and new materialist thinking enabled them to “consider what was produced by the assemblages under examination” (p. 6) and with reference to more-than-human elements. Situational and relational maps aided their understanding of the entanglements within their hybrid research assembly (Fox & Alldred, 2016, p. 157). As part of the methods deployed in this research, participants were invited to generate assemblage drawings of their educational milieux and as a self-portrait as climate activist teachers. These drawings generated rich data, which were explored in follow-up interviews using the drawings as talking points (Everth et al., 2022).

3.2.7 Summary of the Approach

Drawing on the discussion and the cited literature, this research

- was conceptualised as a critical ethnography based on a pragmatic realist paradigm.
- used digital ethnography tools, necessitated by the Covid-19 emergency, but also as a convenient and productive way of doing ethnographic research in the digital age.
- instrumentalised assemblage theory and assemblage drawings as tools to generate, interrogate and visualize data.
- developed theory driven by data in parallel with the ongoing longitudinal research with reference to grounded theory.
- evolved a critical perspective based on the inspiration from the data with reference to the concepts of Deleuze and Guattari.

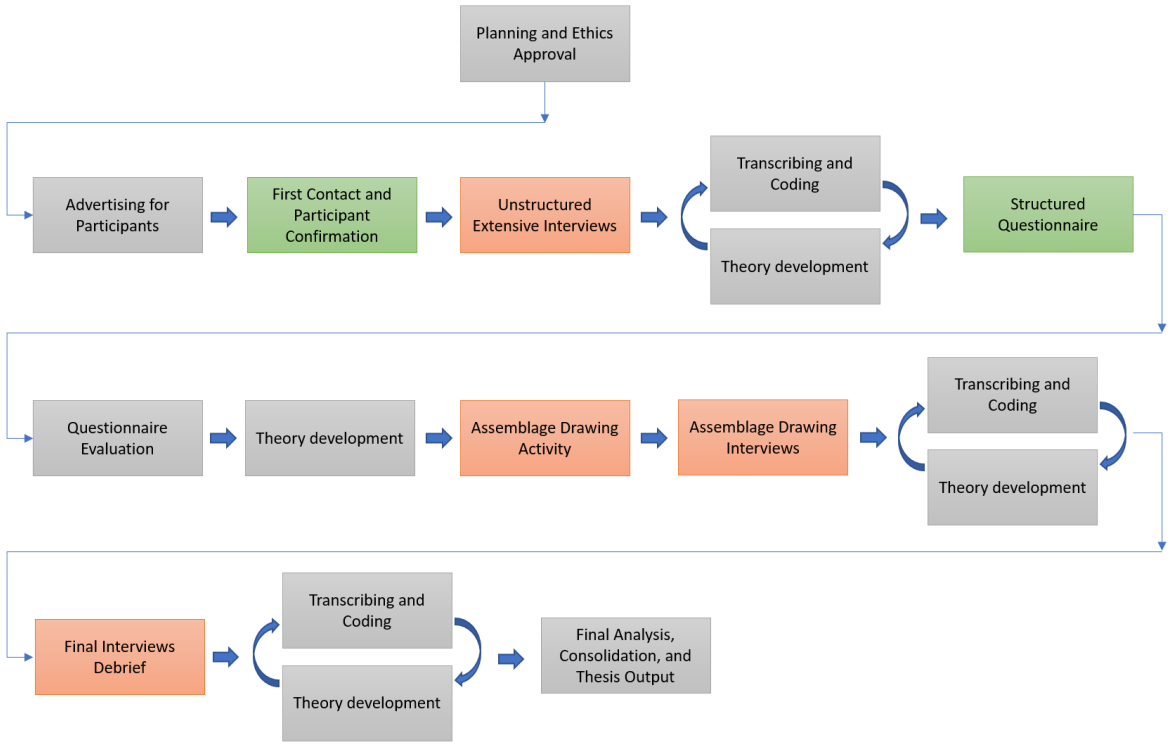
3.3 Implementation

3.3.1 Overview

The research implementation sequence is illustrated below (Figure 3-4). The data-gathering phase started with the first contact and confirmation of participants in December 2021, and the final research interviews with the participants concluded in February 2022. The sequence highlights how sections of data gathering were interspersed with iterative data-driven theory development, literature analysis and the emergence of thematic structures from the data.

Figure 3-4

Research Implementation



3.3.2 Participant Selection

The recruitment process of participants targeted teachers working at secondary schools or higher education settings involved with the training or professional development of teachers who described themselves as climate activists. In particular, the participants were meant to match the following selection criteria:

- Teach in New Zealand in the setting of a high school or area school and predominantly in the senior years, year 11 to year 13. The selection process was also open to educators working in teacher training or professional development.

- State that they are convinced that climate change poses a fundamental threat to the future of humanity and the planetary ecosystems.
- State that they are convinced that education has a crucial role to play in mitigating the climate crisis.
- State that they have ambitions to contribute to educational reforms towards raising the importance of climate change education.

Prospective participants were approached through climate activist networks, teacher networks, and snowball sampling using social media:

- The New Zealand Science Teachers Facebook Group.
- Education for Sustainability discussion group for educators Facebook Group.
- Response.og.nz, leading collaboration on Climate Change Education in Aotearoa.
- Earth and Space Science Educators of NZ (ESSENZ) association and networks.
- NZARE Students & Emerging Researchers Facebook group.
- Extinction Rebellion Aotearoa Facebook group.
- School Strike 4 Climate NZ organisation and Facebook group.

The selection process aimed to produce a selection of participants from Aotearoa's diverse population with the hope of also recruiting participants who identify as Māori to engage with indigenous perspectives. The selection aimed to include a relevant range of perspectives without claiming to be directly representative or generalizable (Feely, 2019; Mason, 2002).

During the participant selection process, informal contact was made with prospective participants via social media or email to confirm their interest in participating in the research and explore the candidates' fit to the selection criteria. Once suitable participants confirmed their interest in participation, they were sent a formal participant cover letter, information sheet, and participant consent form (see Appendix B). Participants self-selected into the research, and all participation was voluntary.

In total, 17 applicants fitting the selection criteria were confirmed as participants. A further 11 people made an initial contact expressing interest in the study but did not respond to further attempts to contact them or did not complete the final step of formal enrolment into the study. The number of selected participants was well within the initial aim of ten to twenty participants.

3.3.3 Participant Profiles

A brief profile for each participant is provided in no particular order. Pseudonyms are used, and places of work and localities are obfuscated to preserve the privacy and anonymity of the participants. The participants' age was not asked during the research. However, because generational differences may emerge as part of the narrative's situational differentiation, participants are labelled as 'young' if they belong to the millennial group, born close to the turn of the century. Otherwise, they may be labelled as 'experienced', meaning they belong to the mature generation of teachers. Some have their own families, and all have extensive life and work experience.

Ella was a young teacher in her twenties, working at a suburban high school where she taught art to middle and high school students. She was deeply interested in sustainability, concerned about climate change, and engaged with recycling, composting and gardening at her school.

Anne was an experienced teacher who previously worked as a high school teacher and researcher and was now engaged in a government-supported role promoting climate change education for schools and teachers in a large urban centre.

Sarah was a young outdoor education, social science, and sustainability teacher in her twenties with a deep interest in nature-based education. She worked in a modern and progressive suburban high school.

Harry was a young science teacher working in a rural coal mining community. Harry was deeply concerned about climate change and navigated the delicate challenges presented by the situation in his place of work.

Karl was an experienced science teacher who worked at a suburban private school. Karl was deeply concerned about climate change and struggled with the conservative political reality at his workplace.

Claire worked as an experienced English teacher at an urban school. She was deeply engaged in sustainability thinking and likes that her subject allows her to use sustainability contexts in her language teaching.

Moana taught at a suburban high school and specialised in Māori medium education. She was an experienced teacher deeply engaged in holistic education based on kaupapa Māori philosophy.

Katherine was an experienced geography teacher at an urban school. She was deeply engaged in sustainability thinking and contextualises climate change in her work where she can.

Jessica was an experienced science, mathematics, and environmental science teacher in a mid-size rural centre. She tried to bring social justice, sustainability, and climate change topics into her work where possible.

Kelly was an experienced educator who worked as a geography teacher in the past and worked in teacher education in a tertiary institution teaching social science to trainee teachers. She was involved in writing climate change policies for teacher educators.

Nora was an experienced educator who worked in teacher education and professional development in social science. She has undertaken research in social activism in Aotearoa. Nora was engaged in teacher networks for climate change action.

Paulene was an experienced mathematics and statistics teacher and worked in a faculty leadership position in a large urban school. She engaged students in climate change contexts when possible but was aware of the structural constraints in her school resisting change.

Rawiri was an experienced Te Reo and Te Ao Māori teacher at a rural area school. He was deeply engaged in the sustainability context and is critical of educational structures and the social contexts and realities in which sustainability education takes place.

Tanya was an experienced statistics and social science teacher at a progressive suburban school. She was engaged in supporting student climate activism and in transforming curriculum design toward providing education for social activism for sustainability.

Brent was a young technology and design teacher at a rural area school. He thought deeply about sustainability philosophy and hoped to engage his students with environmentally conscious design concepts.

Freda was an experienced science teacher at an urban high school. She was engaged in developing curriculum ideas for contextualising sustainability thinking in her science and chemistry classes and supported student climate activism.

Jacob taught science in a rural high school in a dairy farming community. Jacob was an experienced teacher and was deeply concerned about climate change. Dairy farming contributes significantly to climate change in Aotearoa, and Jacob was conscious of the challenges his place of work provides.

3.3.4 Research Interviews using Zoom

The Zoom video conferencing software was used as the interview medium. All Zoom interviews were recorded with video and audio with the explicit agreement of the participants. The recordings were saved on an encrypted hard drive, and the audio part was transcribed using the Otter.ai transcription software tool (see the following section below). The Zoom meetings were scheduled in cooperation with the participants and at times that were suitable to the participant and the researcher. The Zoom meetings were password-protected to prevent random intrusions of others.

For each interview, a standard protocol was followed (see Appendix C). This protocol provided a scaffold for the interview process, including greetings, reminders of the recording of the interview, reminders of the voluntary nature of information sharing and recording and the rights to interrupt or end the interview at any time, as well as a reminder of the ability to edit and co-construct the final transcript within 14 days of receiving it. For each interview, meta-data were collected and archived, such as the time and date of the interview and any concerns arising during the interview in case these were raised outside of the recorded section of the interview. All interviews started with a brief off-record greeting phase to establish a positive and productive professional connection between the researcher and the participants.

Zoom has been reviewed by qualitative researchers (e.g., Archibald et al., 2019; Gray et al., 2020). Zoom is regarded as a highly useful tool for the generation of qualitative interview data and was often rated above alternative mediums, including face-to-face, telephone, or other videoconferencing platforms (Archibald et al., 2019). Zoom is convenient, accessible, and easy to use. It enhanced the ability to discuss personal topics, was time- and cost-saving, and permitted working with geographically dispersed participants (Gray et al., 2020). Archibald et al. (2019) reported that being able to see the researcher was helpful for "forming and maintaining rapport with the researcher" (p. 4). The inclusion of non-verbal clues promoted the establishment of a relationship with the researcher and to "facilitate engagement, building trust, and promoting natural, relaxed conversation" (p. 4). This enabled researchers to collect rich data. Being able to connect with the participants at their place of choice, home or work, added to the method's flexibility and allowed participants to be in their professional work environment or engage from the comfort of their homes. The latter added a more personal dimension to the interview. There were only very minor issues with connectivity or bandwidth. The researcher was connected to a high-speed fibre optic modem, which added to the overall satisfying technical quality of the interviews and recordings.

A first brief Zoom contact before the formal interviews began was conducted as an ice breaker where the researcher met the participants online. Rapport and trust were established through a

general conversation that touched on matters of work, locality, family, and the best times for conducting the research interviews. Some background about the participant and the researcher was shared to establish a relationship. These initial contacts were not recorded and are not part of the formal data-gathering process for this research.

3.3.5 Transcription and Approval of Transcripts

The transcription software Otter.ai[16] was instrumental in the transcription process. The software generates raw transcripts automatically, which the researcher then corrects. During the year of this research, the Otter.ai software gradually improved, and during the latter part of the interviews, fewer manual corrections were necessary than before. Otter.ai also learned the voice signatures of the participants and correctly identified all of them in successive interviews as well as several common Māori language terms. More than 300,000 words of transcripts were generated during this research, and the semi-automatic transcription greatly aided the research progress. The pros and cons of using transcription software in research have been discussed (Louw, 2021), and a loss of closeness with the data has been mentioned as a possible downside. This may be so if transcription software is used in a fully automated manner. However, for this research, Otter.ai was used to generate a first draft of the transcript. This draft was then edited word by word carefully while listening to the interview audio and rewinding as needed to review moments where the audio was unclear, or the researcher's understanding differed from the draft text suggested by Otter.

The ability to listen and read forward and backward contemporary to processing the interview provided for a productive and accurate transcript. Punctuation and paragraphing had to be added manually in many cases because the software found it challenging to determine logical paragraph and sentence breaks.

3.3.6 Unstructured Initial Interview

The formal research interviews began with an unstructured long initial interview with each participant that gave the participant complete freedom to talk about their experience as climate activist teachers. The purpose and design of the first official interview were introduced to the participants with a standard text by email (see Appendix B) informing them of the structure-free nature of the interview.

The method of these initial unstructured interviews refers to the *Talaloto* method, as described by University of Waikato researcher Naufahu (2018). Naufahu found that his form of a 'Tell-All' unstructured and uninterrupted interviews resulted in rich data and that "true lived experiences would be shared rather than ideas constructed 'in the moment' or the sharing of responses designed

[16] https://otter.ai/

to please the interviewer" (p. 19). The unstructured interview's purpose was to remove the researcher's influence as best as possible and preserve the participants' voices in their raw "polyphonic" (Fontana & Prokos, 2007, p. 28) form. I argue that the Talaloto is particularly suitable for data generation for analysis guided by grounded theory and a New Materialist approach to data. For further reference, see (Dolphijn & Tuin, 2012; Fox & Alldred, 2016; Hein, 2016) and (Fox & Alldred, 2015a, 2015b).

The participants greatly appreciated this interview style. Many spoke for close to 45 minutes uninterrupted. I explained to the participants that I would remain silent during these interviews unless they asked me specific questions. However, to aid the flow of these interviews, I deliberately used encouraging body language and facial expressions that indicated an understanding of what was said and to make the participants comfortable with the process. Some participants did stop to ask clarifying questions to assist them with the direction of their interview. In these cases, I would encourage the participants to further expand on aspects of their narratives or hint towards areas they could explore based on what was said so far.

The Talaloto-style interview generated a large body of data. The fact that these interviews were not directed by preconceived questions allowed for the discovery of unexpected contexts and connections. The mean length of these initial unstructured interviews was 36 (σ=8.3) minutes and resulted in a mean of 91 (σ=14) individual codes referred to from a mean of 590 (σ=194) individual references out of a mean count of 5400 (σ=1400) words in each of the transcripts. References were generally linked to more than one code, and codes linked to many references within a transcript. The longest interview lasted 55 minutes and generated a transcript of 9000 words with 937 coding references to 90 distinct codes. Participants spoke a mean of 91% (σ=5%) of the time, with the researcher's speaking time mostly limited to greetings and formalities at the start and a thank you and acknowledgements at the end of the interview. The in-depth analysis of these interviews provided a wealth of themes and triggered significant theory development, which is discussed in the findings and analysis sections in chapters 4, 5 and 6.

3.3.7 Structured Follow-up Questionnaire

The participants had been given complete freedom to speak in the initial interview. This resulted in rich and thematically dispersed narratives. However, after analysing important themes explicitly discussed by some participants but not by others, it was decided to follow up on the unstructured interview with a structured questionnaire of open-ended questions (see Table 3-1). The questionnaire was implemented as a digital online form using the Qualtrics survey software. Of the 17 initial participants, 15 participated in this questionnaire.

Table 3-1

Structured Questionnaire

Who are the students you are focusing on? (School level, adult learners, educators)
For these students, what do you perceive to be the life-challenges ahead of them due to the climate emergency?
In order to prepare these students for the challenges ahead due to climate change, what would they need to learn?
Ideally, how would you like to deliver this learning that you identified above at your school or institution, if there were no roadblocks at all preventing you from doing this?
What are the roadblocks (if any) that currently prevent you from enacting this learning at your school or institution for your students?
How could your school or institution help you to promote the learning you identified?
How could the NZ school system, Ministry of Education, NZQA, help you to promote the learning you identified?
What is your highest concern for the future?
What gives you hope for the future?
Any other ideas or comments, please enter them here.

3.3.8 Assemblage Drawings as Talking Points

Due to the theory development contemporary to the data analysis, assemblage thinking emerged as a particularly productive analytical lens. This was prompted by the deepening engagement with the concepts of Deleuze and Guattari (1983, 1987), the work of DeLanda (DeLanda, 2016), and the publications by Fox and Alldred (e.g. 2015a, 2020b, 2021c). The usefulness of these concepts is reflected in the growing discourse on viewing socio/material phenomena as assemblages and applying the concepts of territorialisation and deterritorialisation in research (Coleman & Ringrose, 2013). The interim results of this research were compared with emerging research findings by a colleague of mine, Ria Bright, based on her research with climate-strike school leaders (Bright, 2023). This collaboration resulted in the publication of a paper (Everth & Bright, 2022) in which we were able to draw on the assemblage concept to generate concrete suggestions to the leadership of schools with respect to the growing desire by students for engagement with climate change and the emerging need for social change. On the back of this work, the next engagement with the participants was planned. The participants were invited to view themselves as well as the education system in which they are employed as assemblages and to generate drawings of these assemblages to represent their ideas.

The interaction was planned as a three-phase engagement, starting with an email to the participants in which the concept of assemblages was explained in an accessible manner, together with the description of the activity they were invited to participate in, followed by the participants in their own time generating assemblage drawings which they then submitted as scanned artefacts to the researcher. The last component of this interaction was a follow-up Zoom interview, during which the researcher shared the submitted drawings through the Zoom screen-sharing feature while the participants explained their drawings to the researcher.

The initial email for this interaction is attached in the addendum (see Appendix B). Four documents were attached to this email with further readings and instructions. Firstly, two papers on assemblage thinking with links to the context of the research: Bazzul and Kayomova's (2016) paper *Toward a Social Ontology for Science Education: Introducing Deleuze and Guattari's assemblages*; Fox and Alldred's (2020b) paper *Re-assembling climate change policy: Materialism, posthumanism, and the policy assemblage*; a document written by the researcher (see Appendix B) that explained the concept of assemblage drawings, gave further details for the task and also provided references to the work of DeLanda (2016) as well as a video to one of his recorded lectures (DeLanda, 2011); lastly, attached was also a collaborative submission made to the New Zealand Climate Change Commission in 2021 by the School of Education of the University of Waikato, in which the researcher was one of the authors under the leadership of Prof Eames. This document was provided as a sign of productive work inspired by the participants' initial contributions to this research.

Asking the participants to engage with the assemblage concept and asking them to draw what would emerge in their minds was an experimental method. I felt encouraged to undertake this engagement partly by my deeper reading of the work of St Pierre (2011, 2017, 2021) and her encouragement to walk new paths unconstrained by convention. The results of this engagement are discussed in the combined findings and analysis, chapters 4 and 5 below. The method of using assemblage drawings as talking points, exemplified by the drawings of two research participants, has been previously published in collaboration with my PhD supervisors (Everth et al., 2022). Due to the more significant time involved in this task, only seven of the initial 17 participants engaged in this activity. However, those who did later commented that this was a highly engaging and worthwhile task, and they highlighted the benefit it provided to them to think deeply about the context of this research and their role as educators.

3.3.9 Final Interview

A final interview was conducted to close the engagement with the participants. Ten of the initial 17 participants responded to the invitation and participated in these interviews. The interviews were conducted in a semi-structured manner with several pre-prepared interview questions and with a final dialogue free of form.

The following questions were asked.

- Do you think we are on the right track in NZ with climate change policy?
- Do you think we are making progress in NZ with climate change education?
- Do you think the population of NZ will unite behind climate change action?
- Do you think the Covid-19 epidemic had an impact on people's willingness to act on Climate Change?
- If you had one wish to promote climate change action, what would that be?

The final interviews were also coded against the established network of codes, and new codes were added as required. The mean lengths of the final interviews were 32 (σ=8.3) minutes, with a mean word count in the transcripts of 5300 (σ=1600).

3.4 Data Analysis Methods

The data was analysed using the NVivo Software, version R1[17]. The video recordings of the interviews were imported into NVivo, and the completed transcripts were exported from the Otter.ai software as time-stamped and speaker-labelled text files, imported into NVivo, and synchronised with the video recordings. From there, the data review allowed direct access to any segment of the recordings via NVivo's extensive searching, coding, and analysing capabilities. Besides the video recordings and transcripts of the interviews, the responses to the structured open-ended online survey were also imported into NVivo. Over 300,000 words of transcripts and survey results were imported into NVivo for analysis. Figure 3-5 shows a word cloud of all data.

Figure 3-5

Word Cloud of Participant Data

Note. The keywords in the word cloud hint at the participants' desire to foreground thinking in education to contribute to climate change education.

The analysis of the interview transcripts progressed in several cycles, starting with the thematic coding of the initial seventeen extended unstructured interviews close to the time these interviews were recorded and their transcripts processed. The coding structure was further extended during the

[17] https://lumivero.com/

successive coding of data from the structured questionnaire, the subsequent assemblage drawing interviews and the final interviews.

3.4.1 Microlevel Codes – Semiosis Part I

Starting with the first unstructured interview transcript, the data were coded sentence by sentence and paragraph by paragraph. Often, multiple codes were assigned to the same sentence or paragraph. Nuances led to a growing network of low-level codes as the coding progressed. This initial coding was not undertaken as a "data transformation process" (Kiger & Varpio, 2020, p. 848) but as a way to attach signposts to the data, which would, on further reading, allow the traversal of the data along routes that could be highlighted and traced along selected tracks. It was the later use of these signposts and the eventual diffraction with the concepts of Deleuze and Guattari through which the data became generative of its meaning.

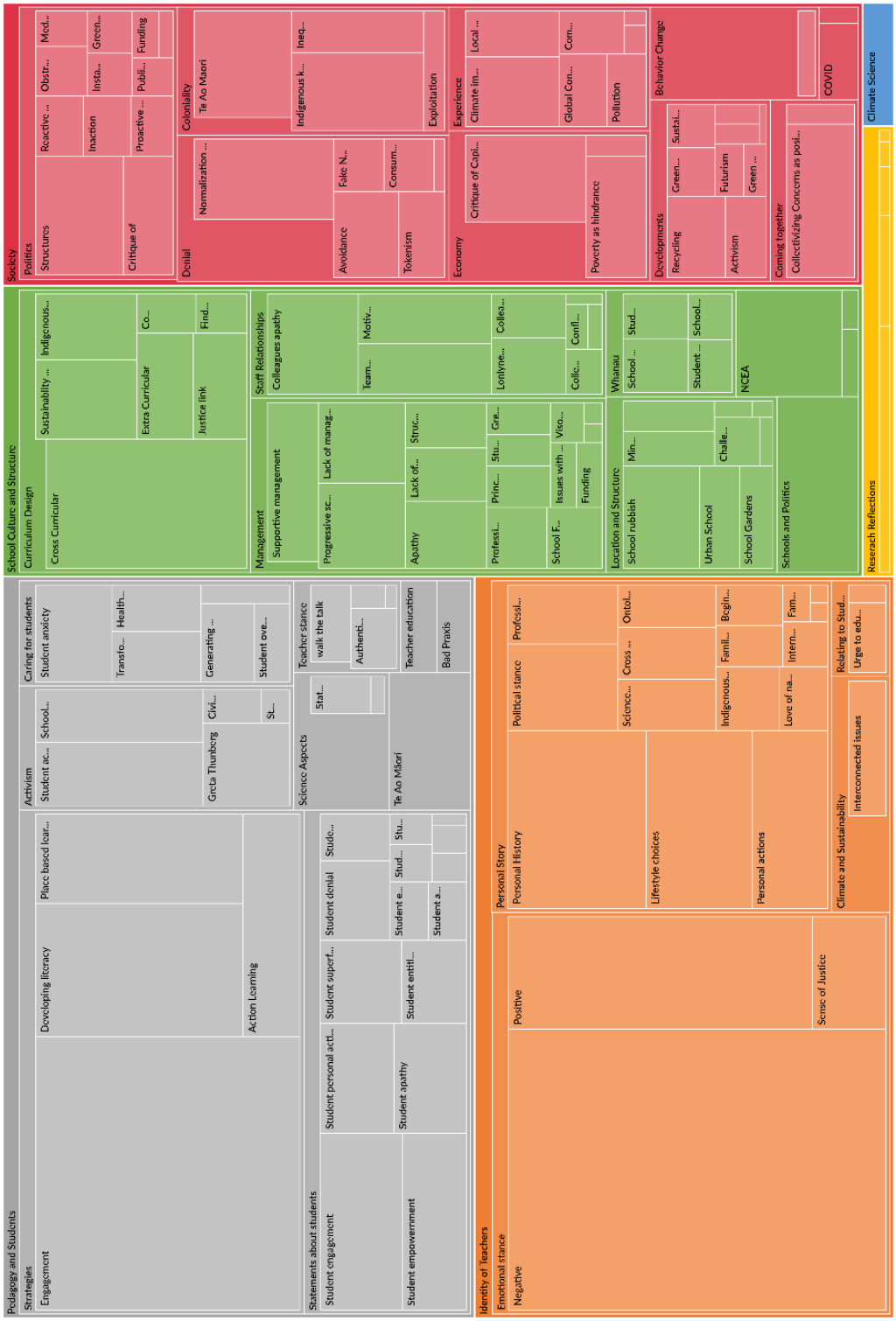
3.4.2 Mesolevel Codes – Semiosis Part II

Through discovery by repeatedly walking waypoints tagged in the microlevel coding and following the emerging tracks, crossings and overlaps, organisational and constructive transformations arose organically in semiotic agential interactions between the data and the researcher. A coding hierarchy was constructed over time, with codes being renamed, regrouped, merged, or placed under emerging higher-level codes. The process of emergence of the thematic coding hierarchy could be viewed in the conceptual language of Deleuze and Guattari as the workings of a machine that territorialises data within emerging assemblages. It is a process of semiogenesis (Sharov & Tønnessen, 2021) by the agency of the research assemblage (Fox & Alldred, 2015a). The research assemblage then becomes a semiotic agential machine, which is distilling, tuning into, eliciting to resonate, and recording meaning from and through the participants' voices. Through tuning into and selecting the theoretical framework described in the theory chapter of this thesis, the research assemblage itself extends into the past through its links to Deleuze and Guattari, Fox and Alldred and many others. The meaning thus distilled is a product of an extended apparatus, not only with respect to the past but also the future, due to the impact their work has on the present moment through their forward-tracing semiotic potential.

Figure 3-6 shows an overview of the coding hierarchy that emerged. The labels are not legible in this figure. However, the overall structure is visible. In the following Table 3-1, the top-level codes are listed in a colour coding that matches Figure 3-6.

Figure 3-6

Emerging Thematic Coding Hierarchy



Note. Figure 3-6 shows a graphical overview of the coding hierarchy. The individual labels are not legible. However, the emerging higher-level structure is visible in the colour coding.

Table 3-2

Top Level Codes

Top Level Code	Comment	References	Next Level Subcodes	All Subcodes
Climate Science	statements about climate science	9	0	0
Identity of Teachers	statements about participants' identity and self-reflections	752	4	55
Pedagogy and Students	statements about pedagogy and students	884	9	60
School Culture and Structure of Education	statements about the culture at the school and the education system	632	9	54
Society	Statements about society, politics and economics	577	10	61
Reflections on this Research	reflections of being part of the research	36	5	5

Note. Table 3-2 shows the meso-level codes with the number of references and sub-codes. Under each of these six top-level groups sits a nested structure of subcodes, which emerged during the data coding.

See also Appendix D, table AD-1 for an example of the Subcodes of the "Identity of Teachers" Meso-Level Codes.

3.4.3 Milieu and Desire – Semiogenesis Part III

The initial thematic coding generated the ability to cross-read collections of paragraphs from all participants coded to the same codes and similar micro- and meso-themes. After many passes of diffracting the reading of these reports with the concepts of Deleuze and Guattari during the parallel evolution of theoretical work, a macrostructure for the findings and their analysis emerged that was adopted in the following chapters of this thesis.

It became clear that the participants were doing two things: with a keen awareness of the climate crisis in mind, they were talking about the *milieu* in which they work and live and their *desire* for change. These two aspects were often intertwined within the same statements, linking a desire to a perceived perception of the milieux. Disentangling perceptions and descriptions of the milieux and the desire for change resulted in the two-chapter concept of reporting the findings and the analysis in chapters 4 and 5.

Applying assemblage thinking and the agential concepts of deterritorialisation and reterritorialisation, procedural categories of action emerged that reveal the agential powers at play and the processes that embody them. The participants' statements on the milieux opened a

perspective into an interwoven network of assemblages with their specific territorialising activities on the backdrop of the relentless growth of awareness of the climate crisis and the profoundly deterritorialising effect it has on many levels of society. Colebrook's (2020a) insights resonate strongly throughout the participant's narrative. The research assemblage is then seen as immersed within this network. Deleuze and Guattari speak about Nomad War Machines as agents of change (Chapter 2.4). The participant's statements about their desire for change were seen as signs of nomadic thought and of Nomadic War Machines emerging with the capacity to become change-makers.

Out of the data diffraction process with the theory, the concepts of Deleuze and Guattari became exemplified and embodied. The result is presented in chapters 4 and 5 of this thesis in an amalgamation of findings, analysis, and reflections.

3.5 Reliability, Validity and Trustworthiness

Concerns over the reliability, validity and trustworthiness of research arise on various levels and stages in qualitative research.

3.5.1 Raw Data

The chosen methods for data gathering, digitally recorded Zoom interviews, digitally gathered questionnaire responses, and participant-generated drawings all produced tangible prime data that are accessible directly and repeatedly to anybody with the right to access these in the digital format they arrived at the researcher. Zoom interviews formed the centre of the data-gathering process, and all interviews can be replayed precisely how they appeared in the frame of the Zoom application at the time of the interview. Compared to qualitative research based on handwritten field notes taken by a researcher, these digital technologies produced raw data without the risk of researcher selection and risk of omission or alterations during the recording phase. The Zoom interviews were recorded with the camera views of the participants and the researcher side-by-side. Therefore, the actions of the researcher himself during Zoom interviews were also recorded in the same way the participants would have perceived them. This adds a further layer of "internal validity" (Cohen et al., 2018, p. 252) and promotes the reliability of the raw data. In principle, another researcher could 're-live' the data gathering part of the research interaction based on the collected and archived raw data. I argue that the raw data are trustworthy as they are auditable and confirmable (Cohen et al., 2018, p. 248).

3.5.2 Co-construction and Validation of Transcripts

The use of Otter.ai aided in generating transcripts that were time-coded to the audio part of the Zoom recording. The completed transcripts were then shared with the participants as links on the Otter.ai

software and Word documents. The participants could listen to the interview recording on Otter.ai while a cursor indicated each spoken word in the transcript text. This allowed participants to closely monitor the transcript, stop and rewind or jump to any desired location. Through this technique, transcripts could be verified and approved by the participants. In this process, the participants suggested only minor corrections, such as misspelled place names or phrases in Māori, which the transcription process did not reproduce correctly. The co-construction and validation of the transcripts added to the validity and reliability of the raw data.

3.5.3 Researcher as a Member of the Group

This research was conducted with participants who identified themselves as climate activist teachers. I count myself in this group of teachers, and the entire research was motivated by my own deep concern about climate change and my view that education will have a crucial role in shaping society's response to climate change. My positionality as researcher and climate activist teacher was already discussed in section 3.2.4 above. As a member of the group, I am very familiar with the milieux described by the participants and some of the desires they express. This insider knowledge adds the ability to triangulate what the participants say during the coding and interpretation phase of the research. Therefore, my insider perspective supports the validity of the interpretations generated during the research phase. To mitigate the risk of tainting the participants' views with my own concepts, a significant part of the interview data was recorded during the initial unstructured 'Talaloto' (Naufahu, 2018) style interviews. During these interviews, I mainly remained silent, giving the participants time to express their views freely without my prompting or questioning. This was a deliberate move to enhance the validity and reliability of the research.

3.5.4 Coding and Interpretation

I made it clear that enabling the education system to respond to the climate crisis is the underlying desire for undertaking this research. It is, therefore, evident that the coding and interpretation of the data are biased by my critical stance toward the lack of meaningful involvement of the education system in Aotearoa with the problem of climate change at the time this research was conducted. This thesis's findings and analysis chapters are interwoven with reflections to provide the reader with an insight into the semiotic processes that I experienced.

3.6 Ethical Considerations

Ethical considerations were part of all interactions with the participants and in the use of the data. As Cohen and Manion (2018) stated, "[e]thics are present at every turn" (p. 111). This research was approved by the Division of Education Ethics Committee of The University of Waikato on 7 October 2020, reference number FEDU065/20, following the standard ethics approval process of the University and the relevant guidelines that applied to the regulatory context of my research.

- The Guidelines for Professional Practice and Community Contact in the Conduct of University Research or Related Activities as published by the University of Waikato. https://www.waikato.ac.nz/research-enterprise/ethics/human-ethics/human-ethics-research-guidelines-for-researchers/
- As a registered teacher and working with teachers as my participants, the professional standards of conduct of the teaching profession also applied to me and my work. https://teachingcouncil.nz/content/our-code-our-standards

The theoretical context of my research ethics was inspired by the affirmative ethics of Braidotti (2019b). I also refer to Cohen and Manion (2018, Chapter 7). Cohen, citing Cavan, talks about ethics as being "defined as 'a matter of principled sensitivity to the rights of others'" (Cavan, 1977, as cited in Cohen et al., 2018, p. 112). In any research, a conflict of interest exists between the ambitions of the researcher and the rights of the participants and possibly others, and ethical concerns formed an essential component of my research praxis. Informed consent, anonymity, and confidentiality formed the basis for the ethical design of this research to guard the participants against potential harm and to establish symmetry in power relations to the extent possible.

3.6.1 Informed Consent and Power Symmetry

Prospective participants received a cover letter, a comprehensive information sheet, a participant information form, and a consent form. All participation was voluntary. Participants were informed that they could leave the research at any time without giving any reason. However, participants were informed that transcripts that had already been accepted before withdrawal would remain part of the data of this research. Participants gave informed consent by signing the consent form and returning it to the researcher.

Participants were provided with a transcript of each interview once it became available. They then had 14 days after receiving the transcript to suggest edits or deletions, including deleting the entire transcript. This gave the participants a degree of power symmetry in determining the final

contents of the transcripts before those entered into the data analysis process. Fourteen days after the transcript had been shared with the participants, the transcript became part of the research. All communications with the participants were conducted by email and were archived on the Gmail email system.

3.6.2 Privacy, Anonymity and Confidentiality

Participants were encouraged to share information about their lived experiences as climate activist teachers during the research. Some of this information might affect their professional relationships at their place of work if it were revealed. This was identified as a possible risk to the participants. It was, therefore, important that the participants remained anonymous in this research. The participants' anonymity and confidentiality were protected through randomly assigned pseudonyms. The pseudonyms were assigned by me, matching the gender of the participants. Neither the name nor the participants' place of work or residence was revealed. However, for at least one participant, who worked in one of New Zealand's few coal mining towns, the place of work provided a critical context to the climate emergency. Therefore, there is a risk that the participant's place of work might be guessed correctly. However, the participant did not mind this.

This research focuses on the professional sphere of CATs as educators. Therefore, the private sphere of the participant's life is not foregrounded. However, the Zoom interviews were mostly conducted in the participants' private time and from the privacy of their homes. This assisted the participants in having a relaxed atmosphere and in choosing times for the interviews that did not conflict with their professional duties. Privacy concerns could have arisen situationally in these settings and would have needed consideration (Cohen et al., 2018, p. 128). However, no incidents developed where this was the case in this research.

While all care was given to maintain the anonymity and confidentiality of participants in this research, this cannot be absolutely guaranteed. New Zealand is a small country, and the identity of participants could be guessed or revealed without the fault of the researcher and the systems in place. Confidentiality concerns in analysis and reporting were addressed by techniques of aggregation and reporting (Cohen et al., 2018, p. 130). In reporting on the findings of this research, care has been taken to obfuscate places of work without reducing the validity of the data by generalising descriptions of the kind of educational institutions the participants worked at. Terms such as 'large urban school' or 'small country school' were used to characterise schools.

3.7 Summary

The purpose of this research is the interrogation of climate activist high school teachers and educators associated with supporting or training high school teachers on their perceptions of the impact of the climate emergency on education as well as the capturing of their desires to instrumentalise education for shaping societies response to the climate emergency. Guided by this purpose and my positionality, the research implementation was conceptualised as critical ethnography.

The Covid-19 epidemic precluded face-to-face research in the participants' professional setting, which is usually expected in ethnographic research. The methods applied for the data gathering were therefore reduced to digital communication channels. However, in doing so, opportunities arose for capturing reliable data in the standardised setting of the Zoom application and the flexible engagement with the participants without the need for travel. Limitations arising from the physical distance between myself and the participants were overcome through repeat engagements over a year, generating familiarity and enhancing the participants' motivation to participate in the research activities. The longitudinal design of the research allowed for an effective feedback loop between the analysis of data and the engagement with theoretical concepts in the purposefully chosen grounded theoretical approach.

The methodology for this research refers to assemblage theory, the concepts of Deleuze and Guattari, and grounded theory. In doing so, it generated a productive lens for analysing the research data and for conceptualising ideas that could lead to transformations within the education system toward a better adaptation to the challenges society faces due to the climate emergency.

Through the research, theoretical insights and preliminary outcomes led to the publication of several research papers, some in collaboration with the PhD supervisors and collaborators (Everth, 2022a; Everth et al., 2021, 2022; Everth & Bright, 2022; Everth & Gurney, 2022), as well as a forthcoming paper on the deterritorialisation of assessment praxis in the NCEA system.

4 THE MILIEU OF CLIMATE CHANGE EDUCATION

4.1 Introduction

The following section maps a cartography of the participants' perceived milieu of climate change education based on interview narratives, questionnaire responses and participant-generated artefacts. This mapping aims to address the first research question:

> How do climate activist teachers perceive themselves, the education system, and their role as educators with respect to the climate emergency?

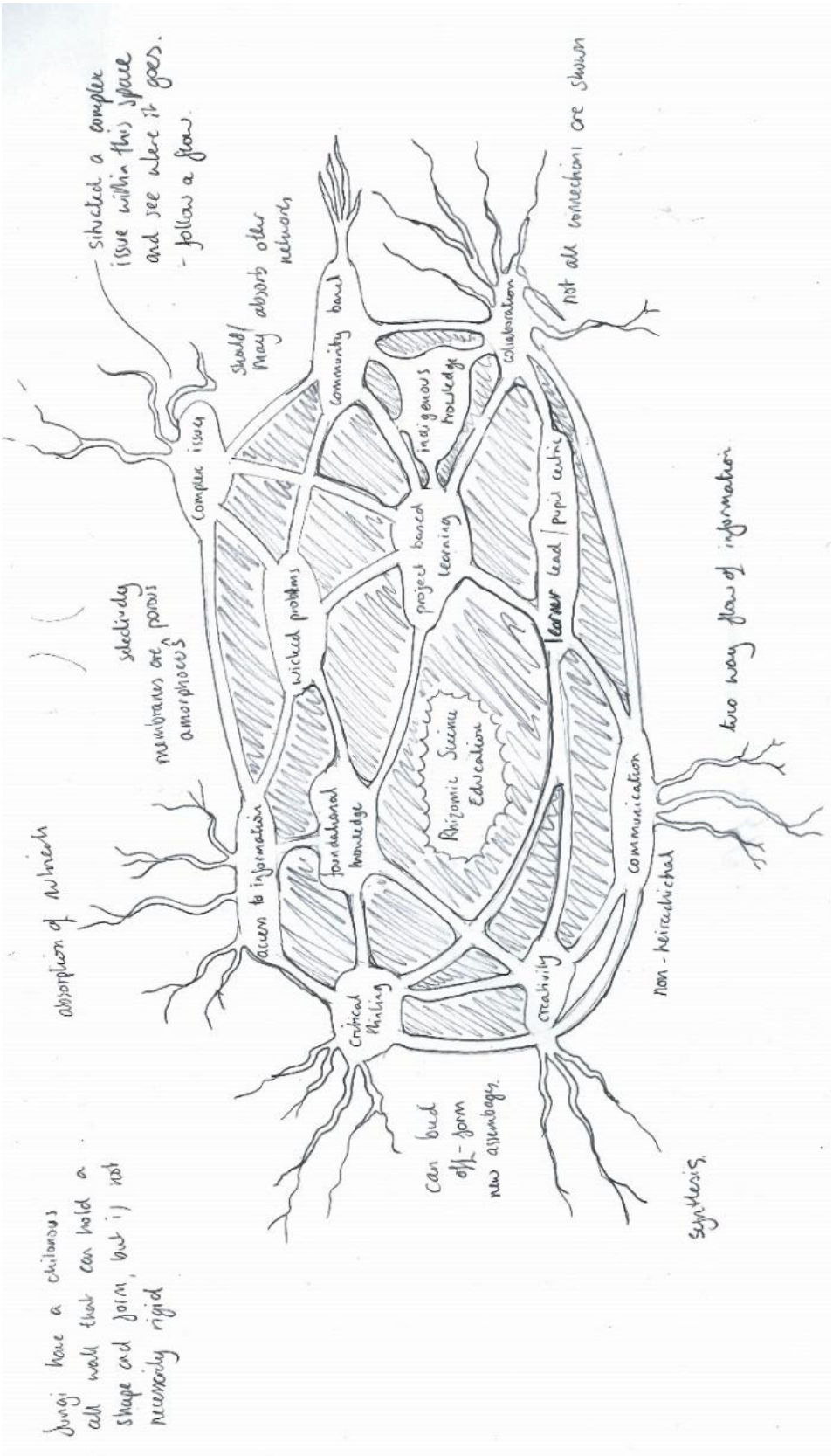
The research participants are conceptualised as assemblages within the rhizomatic milieu of education. Through their perceptions, relationships within this milieu are explored and analysed.

The concept of the *milieu* was defined by Foucault (2007) as "an intersection between a multiplicity of living individuals working and coexisting with each other in a set of material elements that act on them and on which they act in turn" (p. 22). Foucault's milieu corresponds to DeLanda's (2013, 2016) manifold of potentialities, the multi-dimensional space that is morphogenetic for and shaped by heterogeneous and material-discursive assemblages of humans and more-than-human entities (Everth & Bright, 2022, p. 6). Foucault and DeLanda emphasised the relational characteristics of the space they described. The term *milieu of education* deliberately sets a fuzzy scope in line with Foucault's concept (2007). In its centre, we find the structured social organisation of education for the young. At its fringes, all of life can be conceptualised as being part of the educational milieu of lifelong learning. Any interactions involving conscious existence are educational, and a significant part of education happens outside of organised education and forms part of the milieu of education in which formal education is enacted. The destructive trajectories of the Anthropocene necessitate a re-learning of what it means to be human across all parts of society. Climate change education is therefore a society-wide endeavour.

The findings of this research are presented in the form of a rhizomatic interweaving assemblage of participants' narratives, analysis with reference to theory, and the researcher's reflexions by drawing inspiration from Hanely's (2019) exploration of thinking with Deleuze and Guattari and the ideas of Honan and Bright (2016) on post-qualitative thesis writing. Therefore, the term *rhizome* is used here in more than one way. Firstly, it is used to refer to this thesis chapter itself, the way the writing progressed and the way it is intended to be read. Secondly, the term *rhizome* and its adjective form rhizomatic refers to the subject of this study and the way assemblages within the milieu of education arise, morph, and interact.

Figure 4-1

Jacob's Impression of the Relational Rhizomatic Nature of Science Education



Participant 'Jacob' submitted a drawing of science education as a rhizome (see Figure 4-1), illustrating the rhizome concept as his interpretation of the assemblage of education as part of the assemblage drawing interaction (see chapter 3.3.8). Jacob's drawing of a Rhizome is here for the purpose of illustrating a Rhizome. Jacob will talk about his drawings in section 4.9.1 below.

The conceptualisation of reality that underlines this thesis corresponds to the analysis and discussion of the interplay of rhizomatic thinking and environmental education by Tillmanns et al. (2014). The authors summarized that "[t]he rhizomatic view of the world considers the whole inextricable combination of interrelated assemblages of individuals and groups and includes: humans, non-humans, material resources, non-material resources" (p. 6) and highlighted "connection, heterogeneity, multiplicity, signifying rupture, cartography and decalcomania" (p. 5). Ultimately, climate change and environmental education should be seen as significantly overlapping, and the insights of Tillmanns et al. (2014) are productive in the context and structure presented here.

The milieu in which the assemblages of climate change activist teachers constitute themselves is rhizomatic. It has no beginning or end, but it has a multitude of nodes, buds, relations, connections, arboreous structures, and paths of action and power. It is comprised of people, material and expressive elements, timelines, histories, projections, assumptions, and emotions. Deciding where to start with the description of this milieu was no easy task.

> My Reflection: *I count myself as a climate activist teacher, and some of this research's work is, therefore, autobiographic. As I mentioned in the introduction (see section 1.2), the path that led to this research started some years ago, in early 2019, in a deterritorialising moment of realisation that my subconscious attempts at continuously computing solutions to the accelerating problems of the Anthropocene no longer yielded viable or plausible answers. A critical alert pushed through to the conscious self that morning. A deep sense of sorrow filled my mind. My assemblage as a human and a teacher in a world of promising modernity was falling apart. The coding that had legitimised my constitution - that we humans will fix this, that technology will save us, that we will surely succeed - became meaningless. I was deterritorialised, gave up my teaching job and started researching how education could establish itself as an enabler of societal transformation in pursuit of saving this planet for my descendants. I embarked on this study to see how other teachers in my situation fared and what could be learned by comparing notes. And how we could make the best of it.*

Therefore, the first node of the rhizome addresses the deterritorialisations teachers felt through the climate emergency. It sets a lens through which this chapter projects and diffracts the rhizome of the first part of the study's findings.

4.2 Deterritorialisation from Cornucopia

The looming future impacts of the climate emergency cast a dark shadow back into the present. Colebrook (2020a) argued that "[t]he future is already deterritorialised" (p. 346) and called the Anthropocene "an event of deterritorialisation" (p. 351) in which humanity "both alters the planet as a living system, and generates a deterritorialised future" (p. 351). Perhaps prescient of the state of the world today, Guattari remarked in 1983 that the Earth is rapidly deterritorialising itself (as cited in Harrison & Sterling, 2020, p. 19). I argue that the climate emergency constitutes a deterritorialising and fast-approaching transition between *Cornucopia*, the territory of exponential growth and a choice of two alternative future territories on the timeline of humanity's history: *Dystopia*, the territory of extinctions, resource wars, and civilization collapse, and *Utopia*, the territory of ecological and societal sustainability (see Figure 4-2). Perceiving – gazing at – this approaching transition for all its potential and likely consequences and becoming conscious of its magnitude forces a virtual deterritorialisation from inner pastime cornucopian narratives of self and "one's sense of possibility" (Bortolan, 2020, p. 192). For individuals and society as a whole, this rupture of possibilities and personal storytelling risks transitioning from the subconscious pathology of an exceptionalist inhuman gaze (Daly et al., 2020) to a pathology of depression and hopelessness.

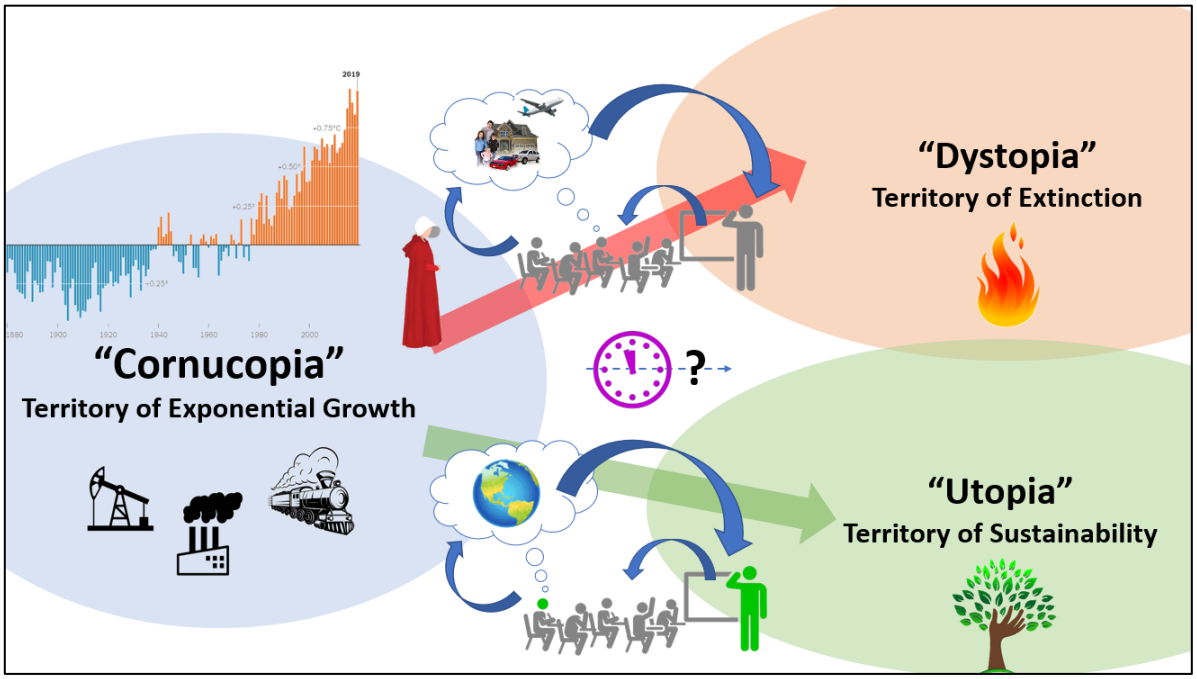
For teachers, the situation is made more difficult because they are affected by their personal deterritorialisations and by the loss of legitimacy and relevance of the narratives of cultural reproduction (Irwin, 2020) they used to invoke for their students. If the prevailing culture is the cause for the impending climate catastrophe and the beckoning of dystopian futures, then how and to what cultural narrative do they teach?

During the extensive unstructured interviews (see chapter 3.3.6), participants displayed evidence of personal deterritorialisations caused by contemplating climate change's future implications and the wicked problem of getting society to act. Realisations of the Anthropocene deterritorialisations affected the generations among the participants differently. The older generation experienced deterritorialisations from past assemblages centring around lived experiences from their cornucopian past. The young generation is deterritorialised from prototypical ideas of cornucopian futures in which they have not yet fully taken root. Many spoils of their parents' generation are already

moving out of reach for younger people. In both cases, emotions of fear, anger, dread, and grief are welling up.

Figure 4-2

Transition Between Three Territories



Note. The transition between Cornucopia, last century's territory of exponential expansion driven by fossil fuels and Dystopia, the territory of extinction, or Utopia, the territory of sustainability, forces deterritorialisations.

In the following paragraphs, statements made by the participants during the initial unstructured 'Talaloto style' interviews that evidence the deterritorialising effect of the climate crisis on them are presented, together with my reflections in italics.

Karl acknowledged that "climate change has been something that's been known around and known about for a really long time" (Karl, Interview #1), but he was deeply frustrated by the lack of change and lack of action on climate change. He thought that climate change is now humanity's number one problem by some distance. Karl said, "If the Earth becomes uninhabitable by humans, nothing else matters. Literally nothing else matters" (Karl, Interview #1). When asked about his hopes for the future, he said, "I can sometimes get very, very negative, very, very negative about this" (Karl, Interview #1). He added that humanity might not deserve to exist if it cannot solve this self-made crisis

— extinction as the ultimate deterritorialisation. Karl's sentiment corresponds to Colebrook's (2020a) deterritorialisation of Anthropos through the contemplation of "non-being" (p. 352). However, Colebrook argued that by the imagination of the demise of Anthropos, as Karl did, a line of flight to a post-human future can emerge, and "something like the 'future of humanity' is formed and secured" (p. 354).

> My Reflection: *Karl's testimony lined up to a significant extent with my own sense of dreadful foreboding, which ultimately led me to undertake this study. When listening to Karl speak on Zoom, I found myself nodding frequently. Contemplating the full extent of the risks posed by climate change has a profound deterritorialising effect on my outlook on life. Imagining the end of humanity in its current shape due to our own actions is well-rehearsed in my mind.*

Jessica said, "[y]eah, um, a mix of emotions, ah, terrified. We have gone past CO2, we've gone past it again, we've moved the bar, and we've moved it again" (Jessica, Interview #1). She found this ridiculous and said it terrifies her because "a lot of people don't think like that, and they're just pottering along, and they'll grow up and have kids and families" (Jessica, Interview #1). Jessica felt deterritorialised from the 'apathetic majority' of society and was terrified of the potential loss of society's physical territory. Like Karl, Jessica was already deterritorialised from the idea that humanity would be just fine.

> My Reflection: *I, too, feel a disconnect or deterritorialisation from the perceived virtual assemblage of the apathetic majority of society and the projections of society cast on screens by media. My understanding of the climate emergency has a deterritorialising impact on me with respect to many others who do not share my concerns. The same notion was keenly perceived and expressed by many participants.*

Ella said she "grew up privileged and sort of was always kind of worried about the environment, as kids are, when you sort of hear these messages about climate change but didn't really grasp it or understand it" (Ella, Interview #1). Ella was conscious of the messages she conveyed to her students. But privately, she admitted to an apocalyptic worldview and said, "We're all screwed" (Ella, Interview #1) and that the best we can now do is to "cushion the end of civilisation" (Ella, Interview #1). She added:

> And, yeah, I mean, so about how climate change affects me as a person and a teacher?
> I guess thinking about ecological apocalypse is something that's just on my mind 24/7.
> I am never not thinking about it. Like, that's how I'd frame it more than climate change.
> I see it more as like a breakdown of all things. And be inevitable. (Ella, Interview #1)

Thinking about this deterritorialisation from viable futures, Ella thought, “It's, yeah, it's a journey that you have to go through yourself” (Ella, Interview #1). For Ella, the territory of Cornucopia never really became a home territory. She seemed pragmatic about the inevitable end of cornucopia and appeared already reterritorialised in a dystopian future.

> My Reflection: *Ella’s emotions reflect my own feelings. I consider my life lived on the exponential growth cliff of the last century as incredibly privileged. And I hedge, like Ella, many apocalyptic thoughts that trigger episodes of anger, grief, guilt, and desperation. I often feel like I am living in an unstable interregnum, a no-mans-land between cornucopia and alternating dystopian and utopian territories. This is a time of many deterritorialising processes that are palpable across a multiplicity of contexts, social institutions, and discourses.*

Claire said her interest in the climate crisis comes from an emotional connection. Claire seemed deterritorialised from ideas of a positive future and stated, “I very much feel like we're gonna lose this game” (Claire, Interview #1). Reflecting on her classroom work, Claire said, “In my classroom, it's sometimes just really easy to feel quite despairing of, you know, of the magnitude of the work really” (Claire, Interview #1). Thinking about her child's future, she said, “My son is going to live in a different world than I am. He needs to learn to live with less” (Claire, Interview #1).

> My Reflection: *Reflections about our children were common among participants with families. I feel a deep sense of deterritorialization between the territory of my upbringing and most of my life compared to the territory into which I envision my children will go. It is not even sure what that territory will be like. I believe that the coming changes will be significant. The world I knew will be gone. Intergenerational deterritorialisations are likely to be common, but this one seems different. It is not a move toward a higher ground but a forced dissolution of certainty and a potential loss of the planetary ecosystem support for my children’s future — a terrifying perspective.*

Tanya said that climate change has been on the radar screen since being at high school herself in the 1990s. She felt deterritorialised from society due to the lack of action. She said, “It boggled my mind that we were essentially doing nothing about it, just watching the freight train coming down the tunnel if you like” (Tanya, Interview #1). Before becoming a teacher, Tanya worked as an environmental engineer. She became deterritorialised from this work because, as she said, “I was working more for the polluters, enabling the polluters, helping people to find the loopholes and mitigating effects, which is nothing like actually preventing effects on the environment at all” (Tanya, Interview #1).

My Reflection: *In my own life, I experienced an ongoing deterritorialising undercurrent. We read Limits to Growth (Meadows et al., 1972) at high school in 1976. This encounter generated an undertow in my life that I could not escape from. Aggravated by the rapidly worsening climate crisis, this undertow destabilised my professional path in the IT industry. I became a teacher in 2010 and embarked on this research at the end of 2019. Narratives, such as the reading of Limits to Growth, can evoke strong deterritorialising agency and enable nomadic tendencies.*

Brent had an upbringing that straddled countries, economies, and cultures, from Pacific Island developing nation settings growing food and sleeping in basic huts, to hippie culture, to modern developed world academia, to the throw-away culture of Western consumer society. Brent stated that this cross-territorial upbringing was formative for him. For Brent, the coming climate transition was not perceived in the same deterritorialising manner as for some of the other participants. In fact, Brent perceived himself as being at home in many places and not defined by any particular territory. Brent appeared proto-nomadic in the DeleuzoGuattarian sense. Brent perceived the uncertainties of climate change, but they didn't seem to pose a threat to his definition of self. However, he was conscious of the challenges it poses. Brent asked himself, "Who am I? Who am I in relation to who have I been? Who am I in relation to what I am now? Or who am I in what I'm going to give in the future?" (Brent, Interview #1) and explained how his perception of himself also affects his role as a teacher:

> Because when it comes to that question of who I am, and I think that's a really important question, as any student gets asked, because you get upset every year, which is a really frustrating thing. I never knew how to answer it. And I think that also reflects in very much the same essence, this idea of this climate thing that we're tackling is that we're not quite sure what the climate of that relationship is. We're not quite sure what the climate of that relationship *to us* quite is. And so, I always felt there was this tension between this old world and the new world, and I think that's kind of where the current education, but I guess more largely holistically, is the climate and how we perceive it and how we think we can attack it, how we think we are actually interacting it with, against what we're actually doing. (Brent, Interview #1)

The deterritorialised future that Colebrook (2020a) spoke of profoundly impacts perceptions of the future in the present. I asked the participants in a structured questionnaire of open-ended questions about their deepest concern for the future. **Jacob** was concerned "that we continue to have a 'growth at all costs economy' that treats the Earth as though it is an infinite resource and leads to huge amounts of environmental degradation with an accompanying mass extinction and a massive amount

of human suffering" (Jacob, Questionnaire response). **Karl** was concerned that humanity would collectively fail to respond appropriately to the climate crisis. He said, "My highest concern is that humans continue to tinker at the edges and don't address the fundamental problems. Humans are famously shit at learning from the mistakes of the past" (Karl, Questionnaire response). **Moana** was concerned that "people do not realise that *we* are the solution to this climate emergency and that we all have a responsibility" (Moana, Questionnaire response, emphasis added). **Katherine** was deeply concerned that "we will pass tipping points and go beyond the point of no return so that it won't matter what we do we will be locked into rising temperatures" (Katherine, Questionnaire response).

The participants' perceptions reveal how their consciousness of the climate crisis challenges their sense of self, uproots them from past narratives and virtual territories within which they saw themselves assembled, and how their visions of the future in which their students will live are affected by climate change. How can one teach a curriculum designed to prepare students for their role in a cornucopian present while holding dystopian visions? Apocalyptic visions are overwhelmingly "a mode of settler-anxiety" (Demos, 2020, p. 9) and a prerogative of the 'white', as Rousell and Cutter-Mackenzie-Knowles (2022) found in their discourse on "The Endings of Worlds" (p. 131). This insight has a significant sequitur. The authors argued that for indigenous people, with respect to the continuous experience of "colonial-capitalistic violence" (p. 132), climate change is not generative of distant dystopian visions but located in the experienced present. Perhaps, intuitively, therein might lie part of the apparent attraction of indigenous cultures to some of the 'apocalyptic set' of whites who might wonder, 'If we can somehow join you [indigenous people] now, perhaps we can avoid meeting the gates of our own future climate hell'? Moana's response above lacks the apocalyptic dimension and instead points to the people, here and now, who she believes are the solution to the climate emergency. The contrast of Moana's response to that of her Pākehā colleagues fits into the mould described by Demos (2020), Rousell and Cutter-Mackenzie-Knowles (2022).

> My Reflection: *I am currently working as a lecturer at the EcoQuest Centre for Indigeneity, Ecology, and Creativity in Kaiaua, Aotearoa, led by Te Ahukaramū Charles Royal. In this role, I am privileged to be involved in a vibrant community where Tangata Whenua and Pākehā are working and teaching together. I personally feel a strong resonance with the insights projected by the work of Demos, Rousell and Cutter-Mackenzie-Knowle that I mentioned above. While I, too, hedge apocalyptic views of the future of my descendants and my own, I sense the possibility of deterritorialising from those. An end of the colonial-capitalistic lifeworld that is predicated by the impossibility of continual exponential growth and its monetary currencies does not imply the apocalypse of all possible and*

already lived lifeworlds. Indeed, it may seem that other people already live past-apocalyptic lives today. Learning from this point of view seems like a crucial opportunity.

The tensions between the no longer tenable present and the possible world endings have a deterritorialising capacity and are particularly unsettling for teachers and their identities. Braidotti (2020) argued that humanity is entering an in-between territory located between the fourth industrial revolution and the sixth mass extinction, and said, "[t]o describe these locations as contradictory does not even begin to approximate the tensions and paradoxes they generate" (p. 256). Braidotti calls this the interregnum between the "posthuman present as both the record of what we are ceasing to be (the actual) and the seed of what we are in the process of becoming (the virtual)" (p. 257).

Some of these concerns are also reflected in the thesis on teacher identity with respect to teaching climate change by Drewes (2020). The author dissects the multifaceted and dynamic elements of teachers' identity generation and highlights the need for consistency. Citing Rodgers and Scott (2008), Drewes (2020) likened a person's identity to a deck of cards, where any card can be drawn at any one time due to circumstances. I argue that the climate emergency troubles these cards, making many of them 'unplayable' or unfit to respond to the quickening pace of climate change and climate change awareness. Staying with this metaphor, the act of noticing that many of the identity cards may have become unplayable due to the climate emergency is profoundly unsettling and deterritorialising. This is especially true for teachers, whose identity is often challenged by the youth they teach, who are in the process of finding their own identities and by their parents, but also by colleagues, managers, and educational authorities.

My Reflection: *My own path of reloading the deck of cards involved deliberate actions such as building my own electric car in 2008 from an old Toyota Starlet[18]. It provided a visible token of difference that aided in generating my climate change-linked teaching identity. But in the light of what is ahead, there is always the sense that nothing is really ever enough. Too many cards in the deck are becoming useless. And here we are, as teachers, tasked to stack the deck of our students with valuable cards that are supposed to be a winning trump in their future. What should these cards hold?*

Findings and implications

The participants report on their awareness of the existential threat climate change poses to humanity and are showing signs of despair at the inability of society to shape and enact a robust response to

[18] My 1990 Toyota Starlet, converted to an EV in 2008: http://www.evalbum.com/1772

the challenge. Imaginations of doom and the end of humanity were common in their narratives. The future is already deterritorialised, as Colebrook (2020a) argued, but so is increasingly the present. The climate emergency has a profoundly deterritorialising effect on people aware of the situation's gravity and its impact on future trajectories and contemplating the climate emergency and the end of cornucopia, if not humanity as such, had a deterritorialising impact on the participants in the present. For teachers tasked to map the future for their students and guide them in their development, this is especially destabilizing. Realising that society will have to let go of cornucopian dreams is painful; being tasked to cast this message forward to the next generations is a task unparalleled in history, where 'tomorrow' always used to be bigger and better than today.

4.3 Deterritorialisations among Colleagues

Most participants reported forms of loneliness with respect to their collegium of teachers and also with respect to students. This loneliness is an expression of the perception of deterritorialisation and deterritorialising events within the setting of their schools. The participants frequently cited other peoples' apathy, disinformation and ignorance as factors that generated the sense of loneliness and isolation they perceived.

Jacob stated, "It [climate change] just feels it's frustrating because it feels like a tide coming in and engulfing you. And it wouldn't be so bad if it was just pupils. But it's staff members within a school as well" (Jacob, Interview #1). And Jacob added, "And you just, you know, I don't know how to describe it. It can feel very overwhelming, very frustrating, and very isolating. Because you feel like you're the only person that gets it" (Jacob, Interview #1).

Ella reported "feeling really weird and alone, around the time when firstly, the IPCC report came out. And I was like, reading up on it all the time and thinking about it heaps, and literally never heard a single colleague mention it. No one, nothing, like crickets" (Ella, Interview #1). She said, "I don't often really talk about this stuff with my colleagues at school unless, you know, sometimes it happens at staff drinks. If they sort of start talking about this stuff, then I might, you know, scope it out and see how deep I could go" (Ella, Interview #1). Ella summarised, "So yeah, there's a, I think, even in, like, the progressive world of teaching that I operate in, there's still a lot of maybe denial, or maybe it's just like, you know, it's pessimistic. We don't want to talk about it" (Ella, Interview #1). Ella contemplated that we don't have much time left to avoid catastrophic climate change. However, her colleagues remained aloof. She said, "I think amongst my colleagues, who are all you know, kind of middle to high income-earners, we're all quite comfortable. That's just something that people just don't want to deal with" (Ella, interview #1).

Katherine felt isolated in her school collegium and reported, “I'm not really aware of anybody else's attempts to do anything [about climate change education]. … I try to have conversations with people whenever I can. But I don't know. I think people avoid me sometimes. It's a fine line between preaching and discussing, isn't it?” (Katherine, Interview #1). And even in the science department, Katherine stated that back in 2007, colleagues did not agree that climate change was anthropogenic. “So that was one of the things I suppose I had to fight against was kind of people's ignorance on the issue” (Katherine, Interview #1).

Paulene worked at a large school and thought, “I'm one of the few. Yeah, that's the impression I get” (Paulene, Interview #1). She also felt isolated from her school leadership, who she thought were just focused on the school's day-to-day administration and have, as she perceived and put it, no clue about the big picture developments of our world.

Claire was frustrated about the lack of buy-in from staff and students. She said, “And, you know, because climate change is inconvenient. It's really inconvenient for people who would like to just live their lives the way they always have. They don't want to make changes. I'm surprised at how few of our staff and the Chairman [of the school Board] actually want to make changes [to their lifestyles]” (Claire, Interview #1). Like Ella, Claire tried to get a composting system working for staff as a way to at least start on some practical action that shifts the culture at her school. However, according to Claire, they would rather throw their food scraps together with the plastic items into the bin.

Rawiri taught Te Reo [Māori language] and Te Ao Māori [Māori culture] at an area school and reported feeling isolated in the Māori community with regard to sustainability and climate change issues. Embracing the issues of climate change can also lead to deterritorialisation within the Māori community. Rawiri reflected on the difficulties of talking about sustainability with his peers:

> I haven't discussed climate, climate change or even sustainability a lot with my other Māori colleagues. When I'm with my Māori colleagues, we seem to be more in the, I guess, the personal space of the now-space of the current issues of Kaupapa Māori [being Māori]. Very rarely do I allow myself, you know, the space to project and actually think, truly beyond this year, next year, next few years. But, you know, having said that, I find it difficult to connect with many Māori about, you know, these are just my personal views. I find it very difficult to connect with Māori about kōrero [talk, discussion] about sustainability. (Rawiri, Interview #1)

Nora worked in teacher professional development and reported on the deterritorialising impact of ignorance on climate change, even within groups of science teachers:

> I have worked with colleagues who, you know, brilliant biologists and scientists who teach science and are heads of science programs in schools who do not believe that the climate is changing due to human activity, which floors me. I really don't know what the answer to that particular issue is. (Nora, Interview #1)

My reflection: *I often felt the same sense of loneliness that Jacob, Ella, and the other participants experienced. Loneliness, because I felt uncomfortable sharing the depth of my dread with anybody. Loneliness because I was unwilling to follow others into a territory where climate change or the scope of its impact were deniable, and I felt unable to make much of an attempt to bring others into my territory. A nomadic stance that ventures between territories seemed the only sensible rescue at hand to me. However, doubts persist about what the nomad can achieve alone, other than self-preservation, by wandering away from too much trouble and even from inconsistencies in the identity deck of cards held (Drewes, 2020). What is the identity of the nomad, and is the nomad at risk of becoming ungrounded and thereby unable to 'stand their ground'?*

Findings and implications

The participant's narrative shows that teachers who are deeply concerned about the climate emergency are likely still a minority. The participants experience loneliness and frustrations at work, surrounded by colleagues who are either disinterested in the topic, agnostic or even in denial about the gravity of the climate emergency. This loneliness is experienced as profoundly frustrating and corrosive to their capacity to fight for change. Collectivising despair (Nairn, 2019) and joining in collective action (Bencze & Alsop, 2014) are central to making a difference, generating hope, and maintaining mental health in view of the existential crisis that climate change constitutes. This is true for students and teachers alike (Bright & Eames, 2022; Pihkala, 2020). I argue that the loneliness in the staffroom that the participants report constitutes a professional mental health risk. Social media provide channels for teachers to connect, but this does not remedy loneliness in the workplace. I argue that climate change education needs to become thematised at schools on a systemic level to generate collective momentum and collegial support for the participants and their wellbeing.

4.4 Hostile Territories

Aotearoa's population of about five million people is dispersed across a wide range of geographic and economic contexts over two main islands. The implications of climate change and climate change mitigation policies differ accordingly. For some regions, the perception of policies meant to mitigate climate change is challenging current ways of life in a greater way than the publicly held perceptions

of the forecasts of a changing climate. Coal is mined in Aotearoa in some places on both islands, and the coal mining industry has created jobs and prosperity for several mining towns (Young, 2019). Oil and gas exploration, especially offshore in the Taranaki region, contributes to Aotearoa's energy sector, associated economic activities, and our country's greenhouse gas emissions (Probert, 2011). However, almost half of Aotearoa's contributions to greenhouse gas emissions come from methane emissions from animal rumens by the dairy, beef and sheep farming sector, as well as nitrous oxide emissions from fertiliser use and animal manure (Leahy et al., 2019). These industries generate a large part of the country's rural economic activity and wield significant political clout (M. H. Cooper & Rosin, 2014). Future emissions mitigation policies are likely looking towards phasing out coal, oil, and gas production. Due to the climate impact of ruminant farming, this sector will see calls for significant reductions in herd sizes. The coming industrial production of plant-based proteins through precision fermentation on a much smaller environmental footprint threatens the future of the entire livestock farming sector (Giuntoli et al., 2023). Therefore, the Anthropocene deterritorialisations in the affected communities are perceived by the stakeholders in the respective industries and communities as caused by anticipated climate-mitigation policies to a much greater extent than by climate change itself. This puts climate activist teachers in the affected communities in a difficult position. They are not only feeling the deterritorialising impact of the impending climate catastrophe but are deterritorialised by the politics and the economic realities of their communities.

Harry taught in a coal mining town in Aotearoa. He said that many of the students in his classes come from families working in coal mining. Harry said, "We got a livelihood here" (Harry, Interview #1) in the coal industry. Talking about his students, Harry said, "And then the dad works in the mine. And now at home, he said: the greenies, they are the worst. And in class, people still say climate change is a lot of rubbish" (Harry, Interview #1). Harry stated that the conflict about jobs being lost in the coal industry if climate mitigation was taken seriously "is his town's biggest theme by far" (Harry, Interview #1). Harry reflected on the fact that the Ministry of Education is moving schools away from using coal burners for heating. This, he said, is a good thing. However, he added that for the students and their families, coal equates to jobs and income. Harry reported that one of his students was planning their career on the future of the coal industry and hoped to inherit the family's coal-selling business. Yet now, this student was becoming deterritorialised from this future due to the threat of climate change policy action that would phase out the use of coal. The largest customer of the family's coal business

was a local milk powder drying company, which was thinking of moving away from coal for environmental reasons[19].

Teachers like Harry often found themselves drawn to comment publicly on social media or by writing letters to the Editor of newspapers when they encountered climate change denial, particularly from official figures such as mayors of towns or members of other government bodies. Like the town where Harry works, the region where I live was led by a mayor who came across as a climate change denier for years. Harry said the mayor of his town posted unscientific ideas and conspiracy theories contradicting climate science online. According to Harry, the mayor has a large audience and is in a place of power. Harry said, "I couldn't stand there and just let him spout rubbish like that" (Harry, Interview #1). Harry was mindful of his role as a teacher in the town, but he said he had to stand up to what the mayor said.

> My reflection: *As teachers, we are generally supposed to be politically neutral, that includes local politics. Climate change politics are cutting deep and dividing society between those dependent on the status quo and those mindful of the urgent need for change. Our own town, where I taught, has put significant growth dynamics into building a canal-living residential development on land that will eventually be inundated by sea level rise. Yet several billion dollars of property investors' funds are being sunk into this project. It provides strong income potential for local tradespeople, the hospitality industry, and the growth of student numbers for our school. Yet, as a climate activist teacher, I think critically about this project and the future liabilities it constitutes when the multi-millionaire properties become eventually unviable. What are my obligations here as a teacher in this town? Should I support the project and those who benefit from it or voice the critique based on climate science that this development should attract? I feel deterritorialised from the part of the community that celebrates the riches this subdivision temporarily provides.*

Jacob taught in a dairy farming community. Jacob said he feels alone in the staffroom with his climate concerns. He reported that his colleagues think the Green Party (who support policies to strongly address climate change) wants to destroy farming and their livelihoods.

> I live in quite a farming area. So, we would be a much smaller school if it wasn't for dairy farming. But the minute you start a conversation about the environmental impacts of farming, so: 'Oh, no, you don't know anything about farming. You're not a farmer.

[19] Aotearoa's monopoly milk processing and exporting company Fonterra used about 700,000 ton of coal per year as reported by NZ Coal (2021) to dry the countries milk for the production of milk powder for export.

> Farmers know, you know?' And it's like, well, I'm sorry, but actually, I do. You know, I do know that about this stuff. I do understand that farmers have to make a living. But I also understand that what you're doing isn't this, you know, it's not environmentally friendly, you know. So, you get it sort of from staff, and you get it from pupils as well. (Jacob, Interview #1)

Jacob reported that the youth in his farming town are disinterested in the climate change message and would rather drive large four-wheel drive trucks around the farming paddocks on weekends because there is not much else to do. "And having a big car is how you impress the girls, I think, for the boys, and then driving it around endlessly" (Jacob, Interview #1). Jacob has become deterritorialised from his community due to the wide gap between the way he and the community and his peers and students perceive the climate emergency. This makes him feel powerless.

Jessica taught in a mid-size town surrounded by dairy farming, which draws large quantities of water from the local river systems to irrigate grass-growing soils and supports the conversion of sheep farms into emissions-intensive dairy farming. Jessica said, "But yeah, pretty much our rivers are used for irrigation of a dryland system that traditionally would have had sheep and probably would have managed sheep" (Jessica, Interview #1). But now, Jessica said, "dairy is probably our major production" (Jessica, Interview #1). Jessica was mindful of the problems this entails for her teaching. She said, "I think that it is really important to educate our students about, you know, that you live in an amazingly significant ecosystem, [and] that the current system we have in terms of our farming is not working" (Jessica, Interview #1).

Karl said he teaches in a private up-market conservative high school catering to parents who can afford to send their children there. The territory seems hostile to his attempts to bring climate change into his teaching. The school is focused on working towards high grades that provide pathways to prestigious career pathways and high future incomes. Karl reported that his school management forbade him to mention anything about the school climate strikes inspired by Greta Thunberg in 2019. He said he was told not to mention anything about this on social media, where the parents might see this. The students were supposed to be at school, not on a climate strike. Karl acknowledged how frustrating this was for him. Karl said that the school management is answerable to the board of conservative governors and that the conservative parents who can afford private high school education for their children are the real customers of this school. Problematising climate change would collide with the political territory in which the school flourishes.

Karl tried in vain to convince his school administration to install solar power on the roof of his school because, as he argued, solar power is ideal for a daytime power user like a school. However, Karl said the person responsible for the buildings was "hugely resistant to buying solar panels" (Karl, Interview #1) and believed there was no economic reason to get solar cells. Karl reported that "the only reason we would ever get solar cells is because it's good PR to the public" (Karl, Interview #1) to enhance the school's image in the light of the fee-paying parents. The assemblage of his conservative school leadership was captured by the territorialisation of his school into the context of affluent and conservative suburbia in his town, where environmental concerns are often suppressed. Hornsey et al. (2018) documented the relationship between climate change denial, conservative attitudes and hierarchical values across nations. The authors report that the effect size of this correlation is significant for the USA. Aotearoa also shows a correlation between conservative attitudes and hierarchical thinking with climate change denial (Milfont et al., 2015).

> My reflection: *After the first interview with Karl, I had a sense that he might not last at this school. Indeed, later in the year, he resigned from his position and joined a more progressive school in a new role. The territory he used to work in was hostile. The deterritorialisation was a predictable outcome.*

Findings and implications

The participants worked in territories, some geographic, others virtual, that were hostile toward engagement with the climate change problematic or mitigation policy. The economics of the regions in which they teach or the dominant social strata in the school community can present themselves as assemblages that exclude the climate change topic. As seen in the testimony of Jacob and Harry, climate activist teachers in these schools can feel particularly isolated, not only within their schools but also in their communities. Local economics in the farming sector or, in Harry's case, the coal mining industry, are at risk from climate change policy and dread the transformations these policies could demand from their communities. In a way, these communities are in a double bind, affected by the coming climate disruptions and affected by mitigation policy developments. Emissions regulation policy development for the farming sector has so far failed due to the inability of successive governments to "cultivate environmental subjectivities" (M. H. Cooper & Rosin, 2014, p. 391) that would be open to questioning the dogmatic assemblages of farming in these communities. These policy failures have deterritorialised these communities and, as Oram (2022) argued, robbed them of their future. Farming areas have a particular need to be supported in the establishment of climate change education, and teachers working there may require assistance in navigating the hostile territories in which they work. The engrained hostilities in these regions against environmentalism

runs deep, as seen in the so-called ‘Groundswell’ famer protest movement in recent times (Cook, 2022). This sentiment contributed to the election outcome of 2023, which shifted Aotearoa to the right and is threatening to derail the country's climate change mitigation ambitions.

4.5 Territorialising strata: Privilege, Poverty and Culture

Several participants mentioned the effects of poverty and societal stratifications as limiting factors for climate change action and education. Socioeconomic status is a predictor of environmental concerns and engagement (Panarello, 2021; Rhead et al., 2018). Teachers generally belong to the middle class in Aotearoa[20]. They belong to the social stratum of people who can afford to consider climate change and have options to make climate-friendly consumer choices, from low-emissions cars to climate-friendly food choices or home gardening on their properties. However, many of their students come from low socioeconomic backgrounds where the family income barely suffices to provide the necessities of life (Easton, 2014; C. Webb, 2017). The teachers and many of their students live in different social strata or 'territories'. In Aotearoa, cultural stratification and the history of colonialisation confound the issues of social stratification further. There is a significant overlap of cultural and socioeconomic strata, with Māori and Pacific Island cultures overrepresented in the low socioeconomic conditions (Marriott & Sim, 2015). While low socioeconomic status was linked in the teacher perceptions as a hindrance to conceptualising long-term thinking and the climate change issue at school, for indigenous people, this does not necessarily preclude deep engagement with climate change. In fact, the indigenous cultural dimension in Aotearoa bears significant potential for a constructive dialogue towards a more resilient and climate-friendly future (Carter, 2019b). This is discussed further in the next chapter of the thesis (see chapter 5.5) and in the theory section before (see chapter 2.3.5). Here, the focus is on participants' perceptions of the territories of privilege, poverty and culture that divide and problematise the milieu of climate education.

Ella reflected on how poverty affects the ability of her students and the community to contemplate environmental issues. Her school is situated in a low-income suburban area. Ella said, "Kids often can't afford lunch, or they, you know, they come to school hungry, and they don't even have like good shoes to wear" (Ella, Interview #1). She contrasted this to her privileged position as a young urban professional with disposable income that affords choices towards a more climate-friendly lifestyle and the ability and willingness to "give things up" (Ella, Interview #1) for environmental benefits. She was frustrated at the prospect of having to teach students about avoiding "non-compostable packaging" (Ella, Interview #1) when their priorities are with the basic necessities of life. She considered having gardens and the time and knowledge to grow her own food as white middle-class privilege[21]. Ella said:

[20] Due to the growing cost-of-living crisis, especially single income teacher families find making ends meet difficult and teachers may find themselves pushed below the bounds of the shrinking middle class.

[21] Ella reflected here on the suburban setting where low-income families live in rental properties with no access to land for growing food while working in low-income jobs with little time for gardening. The situation will be different in rural communities with wider access to land.

> You know, we live in a low-end income area, hence being at a low decile school. And it just makes me so mad that, you know, us white privileged people that, you know, have gardens, and have the time and the money to grow our own food. And it feels very Marie Antoinette-like, playing at peasantry and when, you know, like, our people, you know that my students and their parents and the people in my school's community, they have the most to gain from this stuff. (Ella, Interview #1)

Ella problematised social justice in a capitalist society and admitted that "there's a lot of grief involved in coming to these understandings" (Ella, Interview #). The food poverty Ella reflected upon is a stark indicator of the social stratification in Aotearoa, where, according to the Ministry of Health (2019), almost one in five children in Aotearoa live in a food-insecure home. Since this report was released, the 'cost of living crisis' (Swinburn et al., 2023) has exasperated these issues further.

Anne was aware of the socioeconomic dimension of environmentalism and climate change engagement and the regional territorialisation of rich versus poor neighbourhoods and said:

> Environmentalism, to me, is a socio-economic problem. Northshore, that has these beautiful parks, that has these beautiful conservation activities in Auckland, and they have the Waitakeres [forested ranges west of Auckland]. That's a privilege that they have because of money. We don't have that in South Auckland. Our parks have nothing. They have no biodiversity. They're not good socially and economically. They have no purpose, they've been abandoned, and they have no ecological relevance. And that's because it's a low socio-economic area, in my opinion, so that's where I come from. (Anne, Interview #1)

Kelly was self-conscious that she could afford the extra cost of making environmentally more responsible choices. She said she drives an electric car and can afford to buy products at shops that minimize packaging. Kelly said, "I can afford to do it, and I can afford to make that decision, but it annoys me so much that other people who have different priorities might have the same values base as me, but for them, financial priorities come first" (Kelly, Interview #1). She was conscious of the social stratification of climate change action and said, "I think what annoys me the most about all of this is that it is a rich person's game" (Kelly, Interview #1).

Tanya taught in a modern, progressive, and liberal school in a decile 10 (high-income) neighbourhood where, as she said, students are generally well-engaged in self-directed learning in modern open learning environments. The school, as Tanya said, "is a magnet school for activists" (Tanya, Interview #1). Whereas Ella and others must deal with poverty, Tanya reported that her school has to deal with

“a high proportion of students that suffer from anxiety, and we've got a high proportion of gender-diverse students” (Tanya, Interview #1). The privilege of upbringing and the selective attraction of the school to progressive parents and students generate a stratum of climate activist students and influence the school culture. Growing up with climate change awareness can be generative of significant eco-anxiety (Boyd et al., 2023; Heeren et al., 2022).

Nora believed that teachers must understand the connections between climate change and social justice. She stated, “The longer that my interest in social action and activism for social justice has grown, I have been able to more clearly see that the link between climate change and social justice is huge” (Nora, Interview #1). For Nora, the social justice question was deeply connected with colonialisation and the struggle of indigenous people. This is pertinent for Aotearoa, where the social strata caused by colonialism are still acutely affecting day-to-day politics and the education system. Social and colonial injustice generates territorialising processes that diffract the potential to address climate change.

Rawiri contemplated his childhood growing up in relative poverty, setting him up on a trajectory wishing to obtain the material goods he saw himself deprived of in his youth.

> You know, going back to my childhood with my sister and my mother, who's a solo mom, I guess, you know, we never had a lot when we were young. So, I guess in my mind, I always had that capitalist drive to own and possess in the head, like cars and new material possessions. (Rawiri, Interview #1)

Rawiri reflected that he and his family can afford to look into the long-term future and contemplate climate change and environmental issues. However, contemplating how many of the urban Māori community live, he said, “You know, 10, 15 kids living in one house, all the issues that come with the low socio-economic families, I think that prevents them and us thinking about the future and, and climate change” (Rawiri, Interview #1). However, contemplating the wish for improving economic outlooks for Māori, Rawiri said,

> I think we have, Māori have gone, I think, almost too far down the road of consumerism and the comforts, these false comforts. ‘I want a four-wheel drive, in case I go hunting and I might catch a pig. In case I cross a paddock with some mud in it’. You know, I think we overcompensate, you know, with our purchases. And so, I really think it's, I wouldn't say it's too late for Māori, but I think it's very difficult to find many Māori with an electric car, with a hybrid car, who actually, you know, who are thinking of reducing their waste, who are thinking of reducing the carbon footprint. I can't think of many. (Interview #1)

My Reflection: *The participants' concerns reflect my own troubling thoughts. I now drive a proper electric car after selling my home-built 1st generation EV. I could afford it, and it saves me money driving it. But for a large part of society, electric cars that cost four times as much as an older used car are unaffordable and will be so for some time to come. Public transport is underdeveloped in Aotearoa. A country with five million people stretched over an area where sixty million would live in Europe can only do so much. Preaching the need to invest heavily into mitigating climate change and adapting to its impacts sounds like a pipe dream to people who live paycheck to paycheck. Solving climate change without solving social justice and eliminating poverty seems impossible. But eliminating poverty while rebuilding society according to a low emissions design and at the same time bearing the cost of adapting to sea level rise and other climate impacts in a severely resource- and energy-constrained future seems implausible, too. The future appears indeed to be deterritorialised and splintered into what seems to be mutually incompatible sub-goals and virtual territories. Where are teachers supposed to stand in the awareness of the complexity of these issues?*

Findings and implications

Poverty, inequity, and the long shadow of colonisation are felt by teachers in their work and trouble their ability to appeal to students and their communities to engage with climate change. The participants realise that mitigating climate change must go hand in hand with mitigating social injustice and inequity. As Nora stated, the link between climate justice and social justice is strong. Social inequalities are generally "exacerbated in times of crisis" (Kwauk & Casey, 2021). Kwauk and Casey also argued that the social transformations involved in a green transition have the potential to alleviate global poverty. However, for the time being, socioeconomic pressures constrain the ability of individuals to 'do something' about climate change. While the academic discourse on climate justice is spawning a field of its own (e.g. Foran et al., 2018), it is difficult to see how students with no shoes or breakfast can contemplate climate change-induced behaviour change. The matter of food poverty was also addressed by Jacob in his dialogue over his self-assemblage drawing (see chapter 5.1.3 for further discussion). The participants clearly felt that social territorialisations and assemblages profoundly affect the ability of individuals to engage in meaningful ways with the transformation society needs to make to tackle climate change.

4.6 Lines of Deflection: Token Actions and Futile Gestures

> I think conservation makes people feel good because you're fixing a problem that somebody else did, whereas personal behavioural change is about what you did. (Anne, Interview #1)

Environmental education in schools often centres around activities such as rubbish collection at the school yard or at beaches, attempts to improve recycling, planting some trees or the composting of food scraps. Participants mentioned these activities frequently in the context of climate change education. These activities are certainly helpful in their own right and can have educational value. But in the context of coming to terms with the colossal issue of the climate emergency, these activities risk becoming token actions and futile gestures, one of Gifford's et al. (2018) seven "dragons of inaction" (p. 164, table 7.1). And worse, they can deflect the energy and mind space required for the much deeper engagement needed to grasp the immensity of the climate change problem and catalyse real change. Token actions become actions of territorialisation that capture people and the potentiality for real progress in climate change engagement and contain these safely within the assemblages of current climate-altering social constructs and politically correct practices. Some of the participants are well aware of these issues.

Anne reflected on the elements of conservation topics in education and believes that these can be a type of feel-good tokenism. Her statement above very clearly reveals a major issue for mitigating climate change. Unless emissions caused by each and every one of us, directly or indirectly, drop significantly, we will not be able to mitigate the looming climate catastrophe. Anne reflected that most of her colleagues with an interest in environmental issues are science teachers. She said, "I'm the only behavioural change person on the team. [For them] it's all about pest control. It's all about Kauri dieback [a disease affecting a native tree species]. It's all about tree planting. And that makes you feel really good. But there's no personal responsibility there" (Anne, Interview #1).

Anne believed that, in light of the climate emergency, we need to get into the actual matter and the emotions and the anxiety it triggers in the students. Anne said, "I am not going to tell my kids to go clean up a bloody beach again. That's not solving the problem. That's not changing behaviour. That's making you feel good. It's just, we're so far beyond cleaning up beaches" (Anne, Interview #1). Cleaning up the beach is dealing with one of the symptoms of our throw-away consumption culture but not any of the causes. It is like the proverbial ambulance at the bottom of the cliff. Cleaning up other people's rubbish from the beach may have an educational value. But learning to avoid generating rubbish in the first place is far more important.

Anne argued,

> There's not enough anxiety. I think we're getting this balance wrong. Because they're getting the anxiety from Facebook and social media, where we have no control, and we can't link it to positive behaviour if they don't get any of it from us. That's [how] we're letting them down. (Anne, Interview #1)

Tanya reflected on students engaging in social action. She believed students need to go beyond actions such as collecting money for a food bank, which might make them feel good but doesn't engage them with the core issue. She said, "You know, it makes you feel good about yourself, and you're engaging as an active citizen, but, you know, that's not really tackling the issue" (Tanya, Interview #1). Donating to the food bank only alleviates symptoms. And even the next level of engagement in actively assisting with the food bank organisation is still not tackling the issue. She said, "We're hoping that they'll get to the next level of critical citizenship, which is attacking why it is that we need the food bank in the first place, actually" (Tanya, Interview #1). Tanya reflected here on the themes and goals of citizenship education (Vesterinen et al., 2016; Westheimer & Kahne, 2003, 2007). The question of what citizenship education for the Anthropocene should look like is central to climate change education and worthy of significant research effort (Whitehouse, 2021).

Paulene reported that her school's teacher in charge of sustainability mainly engages in what could be considered tokenism regarding climate change. She said about this programme, "I think it's a lot about rubbish, and trying to get kids to walk to school or bus to school, rather than being driven, and which is a big issue in a city school, that sort of thing. And we're now monitoring our electricity use more closely" (Paulene, Interview #1). But while all this helps to raise awareness, it is not going to the heart of the issue.

Karl was disillusioned by token actions and even by appeals to personal responsibility. He believed that the appeal to personal responsibility is based on a myth and won't solve the real issues. He said,

> I think we've moved past that. So recycling, for example, I'm not really that enthusiastic about recycling anymore because I just feel like this is totally pointless. And it's not actually going to solve the problem. Even if we all recycle everything all the time, it's just nothing compared to the problem. (Karl, Interview #1)

Overcoming tokenism in education will require sustained, measurable, and meaningful youth engagement. I used to tell my graduating classes at my school at our farewell dinner that I believe that the young and the old have the ability to be radical enough to change the world together. I said to them, 'You are too young to have much yet to lose, and I am too old to have much left to lose. Together

we can be the radicals that this world needs to drive the change for a better future'. This reflects on Spajic et al. (2019), who argued that young people have the capacity to take risks and innovate because, due to "their minimal vested interest in existing power structures, youth can question the status quo and speak truth to authority figures if given a place at the decision-making table" (p. 373). People in the middle of their lives are frequently deeply constrained by mortgages or the task of raising a family and have little appetite or capacity for radical social change.

Findings and implications

Token actions, one of Gifford's et al. (2018) seven dragons of inaction, are experienced by the participants as troubling their hope for 'real' engagement with the climate change topic. Sporadic token actions on environmental issues are a common tradition in schools. Timetable and course planning constraints allow only occasional brief engagements with actions that bring students into hands-on contact with environmental issues. However, these actions can become 'pressure relief valves' that deflect energy and capacity from the deeper engagement needed to tackle the climate emergency. The participants see class actions on sustainability projects as essential but feel let down by the tokenistic outcomes generated during sporadic and ineffective habitual practices that schools engage in. To move beyond tokenism for young people must mean foremost that they are listened to by the decision-makers in society. Spajic et al. (2019) suggested that moving beyond tokenism could be achieved by engaging youth through "consultation, facilitation, accountability, and evidence" (p. 373) in roles of leadership for planetary health, including budgeting decisions for the direction of public funds.

4.7 Hypocrisy and Cognitive Dissonance

The question of why society is not acting concisely to mitigate the risks of climate change has been linked to cognitive dissonance theory (Festinger, 1957). Cognitive dissonance arises when pairs of ideas or desires a person holds are relevant to each other within a given context but are dissonant, whereby one of the two ideas or desires contradicts the other. Holding onto these two mutually contradictory and dissonant ideas or desires induces psychological stress (Harmon-Jones & Mills, 2019). In the example of climate change, a person may desire to undertake actions to save the planet but also desire to fly to an overseas holiday or commute daily in the comfort of an SUV (large car) to work. The magnitude of the discomfort from cognitive dissonance scales with the importance of the issue.

Climate change puts in question the survival of civilisation and, therefore, constitutes an issue of utmost importance. However, meaningful actions to mitigate climate change will significantly

impact peoples' desires to continue with accustomed climate-altering behaviours and habits and the entitlement thinking connected with these behaviours. Therefore, climate change is an exemplary context for cognitive dissonance and resulting avoidance behaviours. In the discourse between climate activists and climate deniers, hypocrisy accusations are often leveraged for political point scoring (Falkenberg et al., 2022; Gunster et al., 2018). Parents may wish for their children to live in a climate-safe and sustainable society, but they also may wish for their children to enjoy the same climate-altering and environment-degrading lifestyles and levels of comfort they normalised, setting up a dissonant set of hopes and expectations for the next generation, loaded with potential for hypocritical behaviour.

Frantz and Mayer (2009) argued that people tend to "adjust their beliefs and self-concepts" (p. 212) to align with their actions rather than changing their behaviours. To alleviate the pressures of cognitive dissonance arising from the climate change dynamics, people tend to rationalise their behaviour by adjusting their beliefs about climate change by downplaying the urgency to act or denying how their actions impact climate change. As Frantz and Mayer (2009) recognized, marketing and the consumer society's structure make climate-harming actions challenging to avoid. Cognitive dissonance and the avoidance behaviour associated with it can be considered as having a territorialising potential, triggering lines of flight back to the safety of accustomed lifestyles and lifestyle narratives from the discomfort of Anthropocene deterritorialisations. It is particularly important for teachers engaged in climate change education to adjust personal habits and actions and demonstrate consistency to avoid being labelled hypocritical by their students, friends, and colleagues. The participants' narratives allude to various ways in which hypocrisy accusations are levelled and have a territorialising effect within the context of their work and life.

Freda reported that she felt like a hypocrite before adjusting her lifestyle. Freda said, "I now cycle everywhere. I bought an electric car because I couldn't actually stand there in front of the class and teach about climate change and drive a big diesel four-by-four to work every day" (Freda, Interview #1). When Freda flies, she said, she buys carbon credits to offset the emissions of her flights.

Jacob talked in our interview #1 about the everyday type of cognitive dissonant behaviour among friends who, despite being aware of the climate crisis, were operating a gas-fired outdoor patio heater and eating MacDonald's hamburgers. He said they might as well take a chainsaw to the Amazon. "Oh, it's just a burger" (Jacob, Interview #1) was how he said they rationalised their behaviour and enjoyed the patio heater's warmth.

Jacob reports that his parents, who are not “especially environmentally unfriendly” (Jacob, Interview #1), are flying around the world and driving to shops. He muses about their rationalisations, including their fatalistic thoughts that efforts to save the planet would be pointless. Jacob said his parents contemplated that if a few years down the road, a fascist lunatic would be elected president in Moscow or Washington who unleashed WWIII, it would be “game over” (Jacob, Interview #1) no matter what happens about climate change. Fatalism is recognised as a hindrance to action and risks becoming a self-fulfilling prophecy (D. Taylor, 2023). Jacob also pointed to hypocritical behaviour among colleagues and said, “We've got a teacher at school who chairs the environmental club, and you think that they would be reasonable, you know. But they drive to school every morning, and yet they live 10 minutes away” (Interview #1).

Ella reported that,

> Even the environmentalist teachers that I work with, you know, self-professed environmentalists and myself included, we'll come to school in our car with a takeaway coffee because you can't use a keep cup [in the times of the Covid-19 epidemic]. And, you know, we're sort of like, ‘Oh, don't look at me’. Because sometimes convenience prevails, you know, especially in a field of work where we are so busy, even in a normal year and having all this extra, you know, Covid-19 disruption to worry about, it's totally ok, yeah, and to an extent, you do need to let yourself off the hook for some things. (Ella, Interview #1)

Ella’s comment points to an important distinction. What is reasonable to do and to expect as society navigates climate change mitigation? When and for what will we let ourselves ‘off the hook’, and how do we justify this? When is behaviour hypocritical, and when is it reasonable? There are no solid answers to this. Individual circumstances can justify behaviour, but given the state and trajectory of the planet, purist and uncompromising ideologies are on the rise.

Kelly was highly conscious of climate change and concerned about the future. But she rationalised flying a lot for her job. “I do fly, and I do drive. I'm not saying that I don't do these things, but it's making sure that I'm making good decisions about what I'm doing and why I'm doing them” (Kelly, Interview #1).

Paulene commented on the cognitive dissonance among her colleagues. “There are definitely teachers who are interested in sustainability. But I think if you talk to them about not flying, for instance, that would not be something that they would be considering. It's, you know, its people have very fixed ideas about, you know, what, were they prepared to go with this” (Paulene, Interview #1).

Paulene alleviated cognitive dissonance in her life by accepting significant consequences for her lifestyle. She said she refuses to fly long distances but admitted that this is one of the most difficult things for her. She said she talked about that with her students and said, "I do talk [with my students] about not flying. You know, and because I personally don't fly. Well, for the foreseeable future" (Pauleen, Interview #1). She said she has family in Canada and is unsure if she will ever see them again.

> My Reflection: *I share Pauleen's struggle with having family in faraway countries. I was born in Germany and still have family and friends there. I have taken my family to Germany several times to maintain the connection and give my children an international perspective on their lives. They are dual citizens like I am. But here, I advocate for concerted action to avoid the climate meltdown I can foresee. The wish to maintain my family connections is strong, and so is my desire to save this planet.*

Rawiri was conscious of cognitive dissonance and hypocrisy in the context of contemporary Māori cultural praxis. He contemplated the divergence between the talk (kōrero) of environmental stewardship (kaitiakitanga) and the actual environmental practice at marae[22] settings and the discussion of matters arising (kaupapa). He said:

> You go to any marae, no matter what their kaupapa [principles and discourse], you'll see some beautiful, beautiful things, you know, you'll see some beautiful kaupapa, you'll see a beautiful kōrero, beautiful reverences for things like sustainability and kaitiakitanga, but I don't see a lot of actual doing. I haven't seen many marae that actually sort all the recycling. I haven't seen many marae that actually organized compost/food scraps. I haven't seen many marae that try to reduce the amount of waste they use. When you see the cars that turn up at marae, the big trucks, the V8s, it's the big cars to be, you know, fuel non-efficient vehicles. I don't see a lot of hybrid cars at the marae. I don't see a lot of cheap, very small, fuel-efficient cars when I go to the marae. I see four-wheel trucks. (Rawiri, Interview #1)

Rawiri's perceptions confirm that cognitive dissonance is a cross-cultural matter and likely one of the universal barriers to climate action. Gifford's (2011) dragons are multicultural.

Findings and implications

The participants reported hypocrisy and cognitive dissonance as elements of the milieu of climate change education. Hypocrisy and cognitive dissonance are risk factors for teachers, particularly

[22] A marae is a traditional Māori meeting house and place of cultural affirmation and celebration.

climate activist teachers, when messages about required behaviour change to mitigate climate change are not congruent with individual behaviour. Teachers are closely observed by their students, who can be keenly aware of hypocrisy. Teachers' messages to students must be matched with actions. However, hypocrisy within the assemblages in the education system is commonplace (Kılıçoğlu & Kılıçoğlu, 2021). The cognitive dissonance that is generated by hypocritical behaviour, either voluntarily or demanded by the assemblages in which teachers work or the communities they belong to, impacts their mental health. However, recognising hypocrisy and cognitive dissonance opens opportunities to motivate behaviour change (J. Stone & Fernandez, 2008).

4.8 Students' Emotional Spaces

Teachers and students inhabit, at least conceptually and in the majority, different territories. Students' lives will be largely lived in a climate change and climate-mitigation-affected world, which will be very different from the world in which most of the interviewed teachers grew up. Even a decade of difference is significant because climate change and society's responses are evolving rapidly. While there is always territorialisation by life phases into generational territories between adults and children, teachers and their students, climate change generates a new territorialisation in the time dimension. The foreshadowed end of the exponential growth epoch and the beginning of climate change-induced ruptures and possible apocalyptic end times cause a new territorialising and dividing dynamic between teachers and the generation of their students. Through the participants' narratives, the students' milieu appears diffracted, just like the milieu of society at large. They reported a clear division between a minority of climate-aware youth activists and a majority of others, for whom climate change is not particularly important or perhaps already normalized as a background concern, its meaning overshadowed by the normal challenges of growing up. Student apathy, either due to a lack of exposure to the problem or as a coping mechanism, remains a significant hindrance to broad engagement with climate change at schools (Bright & Eames, 2022). The participants reported on student voices and interactions with students. Their perceptions are presented through a collage of their narratives, from which shapes of the student and student-teacher interaction milieu emerge.

4.8.1 Apathy, Hypocrisy and Denial

Many participants in this study reported frustrations over student apathy. Apathy in students is likely a defensive reaction. Lethonen et al. (2019) argued that "[o]ur reaction to climate change is socially constructed. Apathy is a rational and common reaction to climate change, if there is nowhere else to turn. We need real solutions and options to act" (p. 354). And the authors further highlighted that collaborative action, participatory problem-solving, and learning through dialogue are needed. Bright

and Eames (2022) traced the emotional pathways of student climate leaders from apathy to action and found these students' journeys often started with ignorance and went "through various emotional stages including apathy, awareness, anxiety, and anger before they were moved to action" (p. 14). Student apathy is a reflection of society's overall apathy, as Bright and Eames (2022) found, and can also be the result of "over-exposure to a 'doom and gloom' discourse" (p. 16) and the belief among students that there is nothing they can do that would make a difference. Difficulties seem to arise from the scale mismatch between the all-encompassing global problem of climate change and the minimal impact that local student activities could have on global issues. However, Greta Thunberg pierced this mismatch conception and consequently unleashed a wave of student activism (L. Stone, 2021). In turn, Thunberg's popularity has galvanised far-right commentators in deriding her as a "mascot for radical left political interests" (Rousell & Cutter-Mackenzie-Knowles, 2022, p. 33), which has made student activism as such the target of populist right-wing agitation, propagated by fossil fuel bankrolled media (Rousell & Cutter-Mackenzie-Knowles, 2022). Student activism and teacher-promoted student activism have become a political football with associated risks for students and teachers alike. These risks are fuelling student apathy and constrain teacher activism.

Ella reported a widespread apathy to environmental concerns among students at her school and pointed to students' littering behaviour as an indicator of a careless attitude: "It's lucky if the kids put rubbish in the bin in the first place, most of it ends up littered on the field" (Ella, Interview #1). Ella reflected on the day before the 2019 student strikes in Auckland. She said, "And the day before the strike, I was like, who's taking the day off school tomorrow? Who's going to the strike? And some of them were like, 'What?'. You know, some of them didn't even know it was happening" (Ella, Interview #1).

Karl remarked, "In terms of talking to the kids, specifically, these days, I find there's just a huge amount of apathy about climate change from the kids. There are some kids who are interested in climate change, and they're more informed than average. But I would say that it's a minority in my experience. Generally, kids are pretty apathetic about the whole thing" (Karl, Interview #1). Karl also remarked on a significant amount of climate denial coming from students. "I've experienced a significant amount of climate change denial amongst very young students, which is obviously very frustrating as well" (Karl, Interview #1).

Paulene reflected on an important aspect of our time: the territorialisation of people into different worlds due to the plethora of media, the diffracting role of social media and the internet, and the decline of the culture of reading. She said getting students to read these days and evaluate evidence is very difficult:

> Yeah. I don't see my students as well-informed at all. One of the things that used to happen, you know, I mean, it's now like the old days, but you know, go back 20 years, and people used to watch the six o'clock news together as a family, you know, and that doesn't happen. And the kids don't read the newspaper, and they don't watch the news. And they know less and less about what's happening in the world, not more. And, what I see, you know, what I say is, my students, what their cultural capital is, it is Disney movies. That's what they all come together in and can relate to you. (Paulene, Interview #1)

Paulene's concerns about the decline of reading habits are reflected in the literature (Baron & Mangen, 2021; Thompson & McIlnay, 2019; Twenge et al., 2019), and the diffraction of society through social media is a concern held by many (Goyanes et al., 2021; Lorenz-Spreen et al., 2021; Spohr, 2017). Often, youth consume news and opinions in isolation on their devices and without supporting dialogue with parents. Developing news literacy and agency requires "supportive social norms" (Swart, 2023, p. 517) and the engagement of the education system.

Nora explained student apathy and perceived student laziness due to the lack of experience in life other than the consumer society. "They actually really don't have any other experience, I mean even their parents, lots of young people's parents now will have no experience of anything other than the high consumer society where it is super ingrained" (Nora, Interview #1). The normalisation of the status quo hinders perceiving the need for change.

> My reflection: *Humans have a strong propensity to normalise what is around them, including trends. In my mind, this is one of the most dangerous human fallacies to deal with. Perhaps 'normalisation' could be Gifford's (2018) ninth dragon. Students and their parents are living on the vertical growth cliff of the consumer society and have normalised this experience.*

Freda commented on students becoming enculturated with the hypocritical lifestyles of many climate-aware adults. "There definitely is a section of my senior [students], like I said, who know climate change is happening, but they're still gonna drive a car anyway. Who needs to drive a car in year 12, really?" (Freda, Interview #1). Freda reflected on the entitlement thinking of her students, who, as Freda thought, seemed to say, "I just want to carry on living my life as I want to live my life, you know, there's a percentage of those here as well. And I'm not going to make any effort or take any action whatsoever because that's an entitled kind of population that you get, yeah. My sister did this. My parents did this. I'm going to carry on doing that" (Freda, Interview #1).

My reflection: *In my own teaching praxis, I have found student apathy frustrating. When I think back to my high school years in the 70s, I believe we were much more politically animated. But perhaps I am glorifying the past. However, I found that most of my students were more or less politically disinterested. During the 2019 climate strikes, it took significant prompting from me to get the senior students animated. But I succeeded at last. The seniors got the entire 1000 students at the school to sit down in the shape of a large 410 on the school field. They organised a drone pilot to take a picture from above. 410 ppm was the CO_2 concentration in 2019. Today, in June 2023, it is over 424 ppm. Did the students' actions make any difference? The lack of measurability of action impact is one of the confounding problems of climate change activism.*

4.8.2 Anxiety, Anger, and Feeling Overwhelmed

Climate anxiety, anger, and feeling overwhelmed are often associated with student and teacher responses to climate change. The participants reported similar patterns of student responses as found by my colleague Ria Bright (2023) in her PhD research with climate activist student leaders. The difficulty for teachers is to find a workable balance between acknowledging the emotions of fear and anger while pointing ways toward hope without resorting to patronising deflections from the severity of the issue. Teachers need professional guidance to navigate this space constructively (C. Hickman et al., 2021; Pihkala, 2022), and the education system must recognise this need.

Ella reported on a young Pacifica student who didn't want other kids to hear him, quietly asking her, "Miss, am I gonna die? Am I gonna die from climate change?" (Ella, Interview #1). Ella said she told the student that we could avoid a climate catastrophe if we were willing to make significant changes, like not driving cars. She asked him, "Do you think we can do that?" (Ella, Interview #1). Upon which the student replied, "I don't know, aye, Miss" (Ella, Interview #1). This exchange encapsulates the depth of the worry expressed by some young people and the difficulties in responding to them appropriately.

Especially for young people today, having a reduced life expectancy because of unmitigated climate change is a possibility that cannot be dismissed outright. This risk is genuine for many highly populated tropical regions (Kemp et al., 2022). What should Ella have replied? A definitive 'No, you will be fine' would have perhaps alleviated the student's worry. But at the expense of the whole truth. Even for regions not directly affected by extreme climate events, the expected global disruptions of civilisation due to climate change, from food shortages to large-scale migration, are forecast to be severe (Kemp et al., 2022).

Sarah reflected on the daunting task of being a young person in this time and worried about the added pressure climate change will generate for the youth. She summarised:

> I can only imagine what growing up in this world is like and that is to me, huge. You've got social media constantly blaring. And now, with a global pandemic, things are feeling high pressured. And so, to add to their education pressure is not going to kind of help in the big picture scheme of things. (Sarah, Interview #1)

Katherine perceived the difficulty of finding the right approach to climate change education without causing too much distress and said, "It's a really fine line between freaking them out and educating them. You know, climate anxiety is a real thing. I feel it myself. Sometimes I actually have to stop myself reading about it" (Katherine, Interview #1). Katherine said that she found it sometimes unbearable to immerse herself in the topic.

Jessica reported her perception of students' thoughts on climate change and said, "Our enviro-group discusses that a bit. It is pretty scary, I think. I mean, you know, sitting there as an 18-year-old or 17, 16-year-old and thinking: 'What am I, what am I going to be on?' You know, like, 'Do I have a planet?'" (Jessica, Interview #1). Jessica said that she gets too frightened to think about it as well.

Paulene said, "But I also get the occasional student who has already decided the world is doomed. And that's very sad when somebody who is 16 is already saying, well, there's nothing we can do" (Paulene, Interview #1).

Nora reported, "Young people feel quite a lot of stress, and guilt and pressure, to be, ahem, a burden is a word I've heard used as well, to be fixing the problem that older generations have created" (Nora, Interview #1).

Participants also noted explicit student anger against the old generation for leaving them to deal with the climate crisis.

Claire reported on her perceptions about student climate anger and said that "they're much more in your face about it, they actually have very little patience with adults, and the easy way out. And, yeah, they pull other people along with them, which I think is great" (Claire, Interview #1).

Tanya said there are many students with anxiety issues in her school. She reported an incident in a lesson where a speaker from Extinction Rebellion was invited to talk to the senior students in her social anthropology class. She said:

> And one student at the back was saying, 'you know, we're all hypocrites, we're all eating meat, we're all using fossil fuels to travel from place to place, we're all wearing synthetic clothing. We have all got, you know, fancy shoes, which are probably made, and you know, with huge climate change miles, not to mention the working conditions of the people that made them you know'. She ended up in tears and storming out because she just felt like there was nothing to be done. [It shows] that human nature is inherently hypocritical, and that's a really tricky space to walk, especially because the kinds of students that choose to take the course are often students who feel things very deeply. And on the flipside, [this] can also have significant mental health challenges. (Tanya, Interview #1)

My Reflection: *One of my students in year 11, in a statistics assessment report, wrote about being alive in a 'dying world' — an example of strong deterritorialisation awareness from the living world.*

Findings and implications

The wellbeing of students is closely linked to their outlook on life. The participants report on a concerning and interlinking set of their students' emotional responses to climate change, the daily barrage of climate doom in the media, and the diffracting political tensions surrounding climate change. These are what Rousell and Cutter-Mackenzie-Knowles (2022) called the "political and moral contortions" (p. 29) that trouble "Education at the Ends(s) of Worlds(s)" (p. 36). The authors allude to the cognitive disconnects of the students' and teachers' educational milieu, where every action of our lives somehow contributes to climate change, which then is poised to strike back "with an inhuman force that radically exceeds human perceptions of space, time, and political agency" (p. 37). Teachers are morally obligated to help shape their students' outlook on life. Shaping hopeful perspectives while simultaneously waking students and the community up to take the climate emergency seriously can seem like an impossible tightrope walk. Apathy and denial are obvious coping mechanisms teachers wish to overcome but are subjected to themselves.

From the participants' voices, it seems obvious that teachers will need significant support in becoming upskilled to handle the psychological dilemmas that climate change constitutes for education. Where this support should come from is unclear. As long as humanity and governmental institutions continue to just "tinker around the edges" (Karl, Interview #1) of the root causes for climate change, the emotional dilemmas the participants report will likely remain unresolved.

It is interesting to note here that neither Moana nor Rawiri talked much about the negative emotions of their students. While this qualitative research window does not allow for generalisations, this nevertheless conforms to what Whyte (2018) and Rousell and Cutter-Mackenzie-Knowles (2022) allude to with their insights on the difference in perspectives between white and indigenous people in regard to the climate change crisis and its dystopian dimension. These authors argued that for indigenous people, the climate crisis is not an "impending future to be dreaded" (Whyte, 2018, p. 227) because indigenous climate change imaginations are seen as perceived from a life "where the present has already been dystopian" (Rousell & Cutter-Mackenzie-Knowles, 2022, p. 132) since the times of colonisation. These authors argue that indigenous people are already in a post-apocalyptic state of life and are rebuilding their identities.

4.9 Curriculum and Assessment

All participants were critical of the structures of our education system. The main critique was directed at the division of education into disconnected subject areas and at the focus on teaching senior students to pass standardised assessments, which eliminates space in the timetable of senior school education to address the climate emergency. The contributions from the participants indicate the territorialisation of education into disconnected subjects and faculties, enabled and sustained by governing structures of the national curriculum and the centralised assessment system, that are ill-suited to respond to the galloping crises of our time. This is reflected in the literature with calls to integrate climate change and sustainability education across the curriculum as an interdisciplinary effort (Colliver, 2017; Cross & Congreve, 2021; Kwauk, 2020; Rousell & Cutter-Mackenzie-Knowles, 2020) and, ultimately, to reframe the entire curriculum with a focus on social justice and sustainability (Santone, 2018).

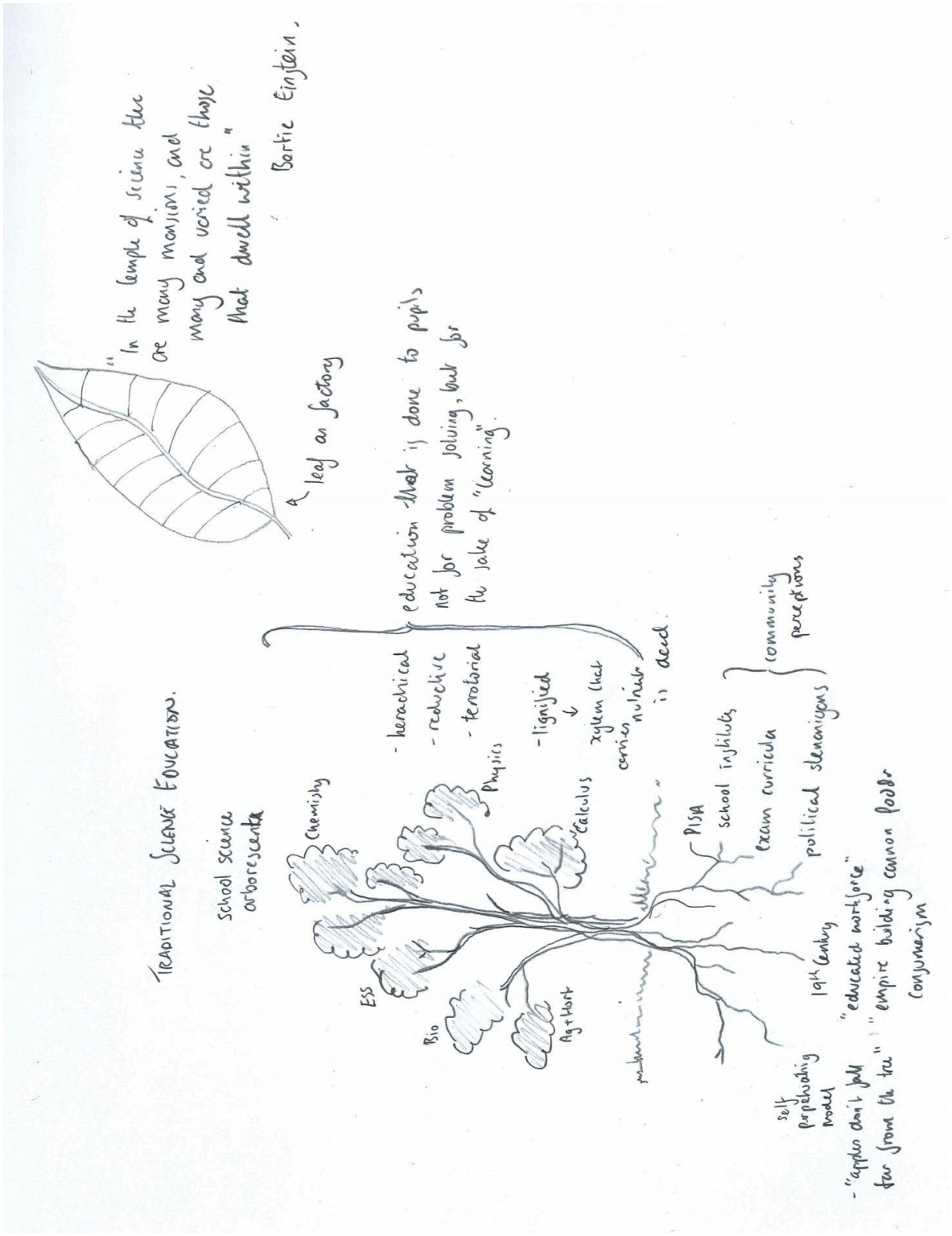
4.9.1 Arborescent Structures of the Education System

During the research, the participants were invited to conceptualise themselves and the educational institutions where they work as assemblages and express their concepts through assemblage drawings. I published a paper with colleagues that presents insights generated from this activity (Everth et al., 2022). Jabob's drawing (see Figure 4-3 below) is one of the drawings discussed in our paper. The following discussion of his drawing cites, paraphrases and reproduces content from our publication with permission from the journal (Everth et al., 2022).

Jacob's arborescent drawing of science education

Figure 4-3

Jacob's Drawing of the Arborescent Structure of Science Education



Jacob was frustrated by the division of the education system into faculties and subject areas, with no space for the integrated approach he felt was beneficial for teaching about and during the climate emergency. He produced an assemblage drawing (see) to critique the current education system with the example of the territories within science education in the form of an arborescent structure (Deleuze & Guattari, 1987, p. 17). It shows the subject areas in education, like branches on a tree, similar in shape and connected only to the stem but not organically networked pervasively with each other. A bidirectional flow of nutrients between the leaves on branches and the roots via the trunk keeps the tree functioning and growing.

Arborescent structures are found in evolved hierarchical systems with vertical connections that enable control, persistence, and growth. They develop within DeLanda's (2016) space of potentiality around structural attractors and optimise performance to govern specific societal demands through strict coding and territorialising habits (Briassoulis, 2019). These structures persist without necessarily serving a well-suited purpose when societal contexts shift. Jacob's drawing echoes the critique of education by Bazzul and Kayurmova (2016), who stated that institutions of science education are largely arborescent because they "work to keep practices, boundaries, and a particular distribution of materials in place" (p. 289). The structure Jacob depicts results from centuries of pre-humanist and humanist education that structured learning to the convenient frameworks of subjects and categorised meaning (Everth et al., 2022, p. 5).

Jacob explained the same idea in his drawing, commenting on the siloed structure of education:

> It's lignified because it's quite structured, and it's very, very hard to change that structure. It has become quite set in its ways. Ossified is the other word I'd use. And it branches off into separate disciplines. Like a tree branch is quite fractal, it gets smaller and more divided and more specialised. When we study science these days, we, you know, we specialise too much, I think, I think we need to go back to a more sort of an amorphous, more mutable model that can be changed in response. Once a tree has grown, it's grown, you can, you know, you can chop a branch off, you can prune it. (Jacob, Interview #2). See also (Everth et al., 2022, p. 6).

My reflection: *The lack of deep cross-curricular learning has constantly frustrated my teaching. I was appalled that Calculus had been removed from senior high school physics textbooks in Aotearoa, resulting in an artificial split between teaching physics and mathematics. Statistics is not integrated with the subjects where it is in common use outside of school contexts, and social sciences stand removed from other sciences. Students*

> *experience the deeply connected world assemblage as a set of unconnected domains of learning and assessment through the arborescent and ossified educational structures we impose on them. It felt all so wrong. (Everth et al., 2022, p. 6)*

Jacob explained that he thought the roots of his tree of education were growing in toxic soil:

> The roots are the places where we're getting our nutrients from. But if you're growing your tree in an environment where you've got to look at PISA [Programme of Internationals Student Assessment] scores, and you can have the argument about whether PISA scores are a meaningful measure of education, you know, or whether they're just another neoliberal OECD [Organisation for Economic and Cultural Development] thing to beat teachers with, and if you've got these school institutes and these exam curricula and these political nutrients that are going into the tree, then your tree is going to grow in a certain way. And that's when it becomes, you know, quite obsessed in this culture with competition rather than cooperation. So, you're kind of growing your system, and your tree is a system in this environment that's toxic. (Jacob, Interview #2). See also (Everth et al., 2022, p. 6).

Jacob offered explanations for the arborescent structures of education and dreams of a 'wilderland' of education where complex and diverse ecosystems sprout a healthy educational food forest from a rhizome within fertile soils:

> And so, we plant the seeds, but we don't let the tree grow as it should do. It's more like an orchard, where you've got row upon row of trees that have been pruned, have been controlled, and they're all clones of one another in an orchard as well, aren't they? They're all, you know, they're all grafted clones. So, what we don't have is a self-sustaining model of education. We've got this orchard model of education that requires a lot of input. If we had more of a sort of permaculture, horticulture, sort of a natural forest, then the lignification of it, the structure and the rigidity of it wouldn't matter so much. Because we'd have, you know, oak trees, beech trees, whatever the succession is. But we don't have that, you know, we haven't got an orchard, we've got a plantation. And that's not particularly healthy, I think. (Jacob, Interview #2). See also (Everth et al., 2022, p. 6).

Jacob's insights, depicted in his arborescent assemblage drawing, reflect the realisation that cultural reproduction, for which the tree was optimised, is no longer sensible when the culture itself is causative of its impending demise (Irwin, 2020). Jacob's arborescent structure of education is depicted

as a mechanism that demands and generates conformity and extinguishes creativity. Jacob's dreams of a 'natural forest' of education link to Irwin and White's (2021) ideas on generating and celebrating diversity as "pharmakon to this process of entropic loss of knowledge, creativity, and spirit" (p. 9) caused by ossification. In Irwin and White's (2021) focus on contemporary cultural drivers, this ossification and loss are promoted by the acceleration of exosomatic technology, digital technologies and their culture-reinforcing AI, and "proletarianisation of knowledge" (p. 7), in which real and authentic knowledge is lost in passive conformity. The 20th-century arborescent structures of education further enforce this conformity. In contrast, the real trees of Te Haumoana's Tainui Trees (Irwin & White, 2021), growing for centuries after being cultivated by early Māori settlers (indigenous New Zealanders) in a diverse natural ecosystem and being part of indigenous exosomatic memories (p. 6, 11), remind of a past without the "schism between humanity and the rest of the natural world" (p. 11). See also (Everth et al., 2022, p. 6).

Jacob pointed to his drawing of science education as a rhizome (see Figure 4-1). He said that rather than being an arboreous structure, education, "should look like the rhizome diagram" (Jacob, Interview #2), in which all things are mutually interconnected. He said about the subjects and topics of education:

> They all interlink, and they all feed into one another. And it's kind of it's an entanglement rather than, you know, you can't sort of put your finger on one thing and say, this is the problem, you have to acknowledge that this influences this, and this influences this. And there's a whole raft of positive feedback loops and negative feedback loops that come into this. (Jacob, Interview #2)

Jacob said that educators, like a mycelium in the forest floor, should feed the information and learning back into the community, nourish fertile ground, and "spread out tendrils into other areas" (Jacob, Interview #2). Jacob believed that the "selectively permeable" (Jacob, Interview #2) structure of the rhizome allows to be careful about that is let in and about what is encouraged to grow. Jacob said, "the fruiting bodies that come up, the actual toadstools that you see, [are] only like 10% of the mass of the fungi. Everything else is going on under the surface.

> My Reflection: *When becoming a teacher, it seemed important to understand the arborescent structure in which I was to take my place. I had to assimilate myself within structures of power and tradition that define the tree's shape; the rules of NZQA [New Zealand Qualifications Authority] assessments; the demands of measuring and performing to a coded standard; the need to grade students; the expectation to become part of a*

fellowship of gardeners who prune, graft and shape this tree to spoken and unspoken codes and to defend its culture of territorialisation. I was enculturated to send sustenance generated by dutiful teacher and student compliance down to feed the roots into Jacob's 'toxic soil', which would reward me with payment of my wages and professional approval. Erring from the structure and into the rhizomatic flows of teaching across subjects and topics and bending assessment standards to shape got me more than once into trouble — delightful trouble with good endings. There is hope. (Everth, 2022b; Everth et al., 2022, p. 7)

4.9.2 Territorialisation through Standardised Assessment and Siloed learning

Many participants directly critiqued the territorialisation of learning through the National Certificate of Educational Achievement (NCEA) assessment system (NZQA, n.d.) and its overbearing power to structure the enacted curriculum at schools in Aotearoa. This system prescribes a set of achievement standards students are assessed against throughout the year in the form of several internally marked and externally marked assessments at the end of the school year. The NCEA system is structured in levels 1, 2, and 3, which are meant to match students' learning development in years 11, 12 and 13 (15-17 year olds). At each level, assessment is divided into subjects, and within each subject, into a set of internal standards (assessed by the teacher in the school) and external standards (centrally assessed by the NCEA administration at the end of the year). Each standard specifies three levels of achievement from 'Achieved' to 'Achieved with Merit' and 'Achieved with Excellence'. Within each achievement level, specific criteria are established that categorise standardised expectations against which the student's work is assessed.

Teachers can choose which achievement standards to offer the students for assessment each year from a limited set of published standards for each subject area. The achievement standards are published documents containing detailed prescriptions of the specific knowledge and permissible activities the students are assessed against. Once these standards are selected, the teacher's course planning evolves around teaching the students the skills and knowledge required to pass these assessments. Effectively, in most schools, the course planning of the year is dictated by the assessments the NCEA system provides. While the New Zealand Curriculum (MoE, 2007) is the central reference document for teachers' course planning, the NCEA assessment system is the effective territorialising structure that determines the enacted curriculum in secondary schools.

The categorisation of students into levels of achievement has significant consequences and generates inclusions and exclusions for their post-school professional progression. It is also often working to maintain social strata, as students from homes with some degree of academic history frequently perform better than students without such background in their high school outcomes

(Meehan et al., 2019). Territorialisation through assessment then becomes a way of perpetuating social strata. Concerning Aotearoa's bicultural status, this affects Māori and Pacific people, in particular, who more often grow up in households without prior academic education (Meehan et al., 2019) and traditionally are disadvantaged by this assessment system.

Schools are under pressure from parents, students, and the education system to ensure students achieve high pass rates and good grades at the NCEA assessments, and the assemblage of the NCEA system gains effective powers of territorialisation over the school's year planning down to structures of timetabling and the allocation of resources. This assessment system reinforces the territorialisation of learning into specialist siloed subject areas. Annual external moderation by NCEA officials corrals planning by teachers and heads of faculties into risk-avoidance strategies and 'best practice' routines advertised by NCE and curtails teacher creativity. (Hipkins, 2004; Hipkins et al., 2016).

The system is set up to ask: 'How do we teach to achieve better grades within a set of national standards?' and not 'How do we teach to equip students with the skills and knowledge to achieve a transition to a sustainable society?' The NCEA system actively locks secondary school education into a rigid structure, siloed by age, subjects, and achievement steps, and eliminates degrees of freedom for the sake of standardisation and accountability of cultural reproduction. Its rigid implementation limits teachers' imagination and aims to iron out differences. However, seeking difference is what society must do in this time of significant social transformations that climate change mitigation and adaptation mandates. From the perspective of Deleuze and Guattari, this system is a giant territorialising assemblage, with large sets of documents detailing its internal coding and demarcations between belonging and exclusion.

> Standardised assessment attempts to control difference by imposing structural constraints for the sake of categorisation of individuals along predefined qualities and modelled identities. Natural differentiation and the creative powers it entails is replaced by categorising identification. In paraphrasing Weinbaum (2015), standardisation is the method of the neoliberal political programme that likes to presuppose "how one should live" (p. 320), while deterritorialisation sets education free to explore "how might one live" (p. 320). (Everth, 2022b)

It takes courage and creativity to deterritorialise this system to enact climate change education and to achieve cross-curricular learning at the secondary school level. Here, I present a selection of participants' voices that speak to the territorialisation of learning by the NCEA assessment system and

also the territorialisation of learning into siloed subject areas in general, which restricts effective cross-curricular learning. I also refer to section 5.2.3, where the participants discuss their desires to deterritorialise the assessment praxis.

Karl said, “And something I feel is that climate change is not really in the curriculum very much. In fact, it's not really in the curriculum at all” (Karl, Interview #1). Karl said that in the NCEA and International Baccalaureate (IB) systems, “there's very, very little content in the curriculum, even the science curriculum, about climate change” (Karl, Interview #1). With respect to exam pressures, Karl added, “Whenever I talk about climate change in class, I am almost by definition, off-topic, even if it's an example of something we're talking about, it's still a little bit off-topic. So that's one reason why the kids aren't really interested, because they're not going to be examined” (Karl, Interview #1). Karl added, “Schools are restricted with what they teach because their predominant role is to prepare kids for the assessment of their academic knowledge. Therefore, what schools teach depends on what the Ministry of Education decides are the priorities” (Karl, Questionnaire, Q6).

Claire was mindful of the siloed structure of the curriculum and said, “And so we remain really siloed and our department areas, we remain really siloed with doing our kind of English or math, science” (Claire, Interview #1). Claire was critical of ‘Credit Farming’ based on the constant pressures to assess student learning under the NCEA system. She said, “And you know what, instead of what we call credit farming, we're just teaching to credits all the time, what we'd like to see students do is actually do some meaningful, authentic work” (Claire, Interview #1).

Katherine reflected that there is not much cross-curricular work between departments in her school and said, “We don't collaborate too much, which I think is a bit of a shame”. (Katherine, Interview #1)

Kelly, working in teacher training, commented that she would like to work more cross-curricular in her courses but found this challenging as teacher training remains siloed into learning areas. She said, “How these courses can more specifically focus on issues of sustainability and the environmental issues that we face, I don't know. It's a challenge for the future”. (Kelly, Interview #1)

Rawiri said he would like to combine courses from different subject areas into a sustainability context but said the subject-based NCEA assessment structure is holding this back. He wondered who these people are who are deciding on the NCEA achievement standards and whether they are still actually teaching these days. He thought they were “out of touch” and wondered, “if they're actually teaching, how long ago they've taught, are you on the current coalface?” (Rawiri, Interview #1).

Freda was critical of the subject division of the NCEA system. She said scientists use many skills that the narrow spectrum of often contrived knowledge assessment under NCEA is not assessing. “So

there's a lot of skills that those scientists are using that the NCEA does not develop in our students at all" (Freda, Interview #1). Freda added, "Because it's NCEA, you've got your assessment, and your assessment drives what you teach. And there's no climate change intermixed with the assessment. It's not focused in the curriculum in any way at all. It's really up to the individual teachers to do it" (Freda, Interview #1). When asked by me if she thought that external moderation is restricting meaningful assessment praxis, Freda said, "Yes, absolutely, 100%. You do it their way. It's not necessarily the only way of doing it, but you do it their other way. And so sometimes when you may think you've got a great assessment, you're doing it well, and then they'll be like, No, we're not. So, there's a lot of extra anxiety around that. Yeah, not a lot of freedom or trust with us" (Freda, Interview #1).

Ella critically reflected on the diffracted collegium at her school, where staff are divided into curriculum areas. She said, "You need to have everyone on the same page if you're going to have some kind of universal way that we want it [climate change] to be approached in education" (Ella, Interview #1).

Jacob, in his first interview, reflected critically on the siloed education system in Aotearoa and said that he believes that concerning 21st-century problems, "we are not producing individuals within the education system who are capable of solving these problems" (Jacob, Interview #1). Instead, he believed that "the way that our education system is set up is to squash all these children into this big mincing machine" (Jacob, Interview #1).

Findings and implications

The participants' voices confirm the view reflected in the literature that effective climate change education should be a cross-curricular endeavour. As depicted by Jacob's drawing, the current arborescent structures of education with territorialising assemblages of faculties, curriculum and assessment silos are perceived as a significant hurdle for enacting effective and transformative climate change education. However, these structures are deeply engrained in the culture of Western education systems. A deterritorialisation of these assemblages could open pathways toward a deeper engagement with the underlying social, technological, and economic interdependencies that maintain society on its climate and environment-destroying trajectories.

Calls for a cross-curricular approach to climate change educatio8n are supported by research with teachers in England (Howard-Jones et al., 2021) and work by Kiely et al. (2021) on the development of a cross-curricular programme corresponding to the UN sustainable development goals. Going further, Okada and Gray (2023) explored climate change and sustainability education not only as a cross-curricular endeavour but in close cooperation across educational levels between

“between universities, schools, enterprises, policymakers, and wider society” (p. 1), and Santone (2018) argued for a reframing of the curriculum with respect to social justice and sustainability. However, Eilam (2022) argued that climate change education should become a separate domain and its own disciplinary subject.

Prescribed territorialisations of assessment in secondary schools through the NCEA system into subject and faculty-centric achievement standards, as critiqued by the participants, are a main hindrance to the deterritorialisation of education in Aotearoa. The participants' voices confirm experiences from my teaching praxis (Everth, 2022b). The standardised assessment praxis not only territorialises learning but curtails degrees of freedom across all of education. It thereby hinders the evolutionary search for solutions at a time when new ways into the future are desperately needed. It is a territorialising assemblage that categorises students into classifications of achievement and future career paths.

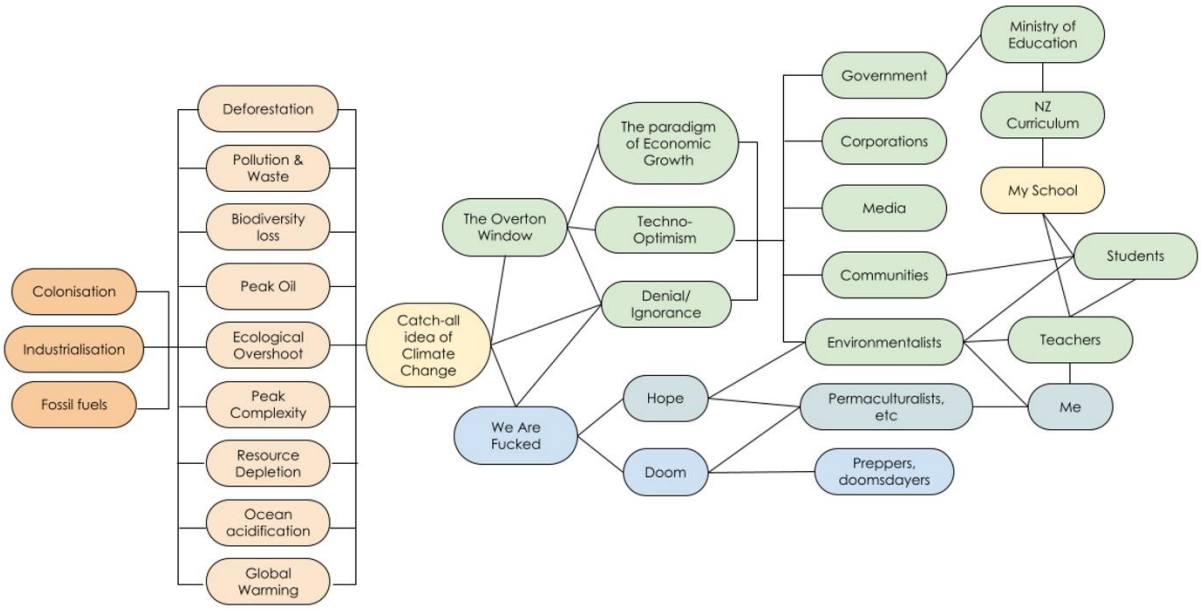
4.10 The Overton Window, Politics and Territorialisation

Schools can be averse to bringing politics into the classrooms, at least overtly. But of course, political constellations in society permeate school culture. As participant Ella suggested, they define the edges of the *Overton Window* of permissible discourse in the school environment. The Overton Window concept was post-humanly attributed to Joseph Overton, who was senior vice president of the Mackinac Center for Public Policy in the USA (Mackinac Center for Public Policy, n.d.). It has recently been discussed in connection with the need to shift the public debate on climate change in an editorial in The Lancet (The Lancet, 2021). The Overton Window represents a range of views acceptable as part of the political, public, or professional discussion for a given context. In the context of education, the Overton Window captures a range of culturally acceptable views teachers may be able to express.

Ella produced an assemblage drawing for this research that depicts her perception of the reality of climate change education at her school. Ella explained her assemblage drawing (Figure 4-4) in our second interview.

Figure 4-4

Ella's Assemblage Drawing



On the left, she set out the contributing causes for the set of Anthropocene symptoms, which Ella sees as Colonisation, Industrialisation, and Fossil fuels. Ella sees the various negative symptoms of the Anthropocene represented by climate change as a catch-all phrase.

My Reflection: *Ella reflected on something that is often on my mind. Climate change has become the 'bogeyman' representing a collective of Anthropocene overshoot processes. Climate change is a symptom of an underlying systemic disease. This symptom alone could kill civilisation. But responding to climate change in isolation without responding to the deeper problems will not heal the patient.*

On the right of her drawing, Ella said, the green boxes represent what is talked about and what affects life at the school. The discourse at school, she said, is filtered through the Overton Window of acceptable views for school discussion. Ella saw herself represented in the blue boxes at the bottom of the right part and saw her private views as excluded by the school's Overton Window censorship. She said, "No one wants to hear how truly screwed we really are. And for me, that's a thought that I can hold in my mind quite comfortably" (Ella, Interview #2). Ella said she had read many recent reports, such as the latest IPCC reports and that she gets quite "obsessed with it" (Ella, Interview #2). She thought that catastrophic climate change could not be averted anymore, and we should probably not talk too much about mitigation anymore but focus on adaptation to the difficult times to come.

Ella said:

> Coming to terms with the fact that we're in this phase of, you know, the collapse of industrial civilization, it's not something that's happening in the future, it's like happening now. And we're living it, and it's, you know, the sixth mass extinction. So, you know, that's definitely stuff that is not in what I've put as the Overton window, kind of beat around the bush, but it's on the bottom in blue. We are fucked! (Ella, Interview #2)

For Ella, the question arose of how to respond to this. She saw two pathways. One is leading via doom-mongering to the "preppers, the millionaires buying bunkers in Queenstown. And, you know, it's kind of weird Americans who just like hoard food and buy lots of firearms" (Ella, Interview #2). A different path opens up where she sees herself as being "married to hope" (Ella, Interview #2). Ella said:

> And for me, the environmental movement kind of sits outside of this paradigm 'actually, it's too late to do anything. This is just the new reality. This is the world we live in. This is kind of the end of all things. Because to be an environmentalist, an activist, you have to have that hope. (Ella, Interview #2)

Ella saw permaculture as her response to the climate emergency. She said she is engaged in permaculture groups in her community and teaches permaculture concepts at her school. Ella said

that her school is mainly vetted to a mix of techno-optimism, denial, and a perpetuation of the economic growth mantra. Ella thought the restrained context of discussion at her school limits the treatment of climate change to "surface-level stuff" (Ella, Interview #2). Ella summarised her school's stance by saying:

> In science, we will learn how greenhouse gases work and how emissions work and why they have the effect that they do in the atmosphere. And I think it's in social studies, they learn about renewable energy and stuff. But there's not really any kind of deeper questioning happening, like even discussing these with the teachers who teach them. Like all they want to talk about is e-waste and giving up straws. I would encourage a deeper questioning and criticality of this kind of stuff. Or just more openness to different ways of living even. School feels like it's still just a neoliberal factory. (Ella, Interview #2)

Ella perceived the Overton Window as a territorialising instrument that excludes perspectives on climate change and the bigger picture view from the level of discussion and engagement that the topic would demand. The activism of Greta Thunberg and the school strike movement has been instrumental in opening this window further toward including more radical views about climate change in the school context. However, according to Ella's testimony, a lot still needs to be done to open this window much further. Ella's explicit discourse on the Overton Window was implicitly reflected in some of the testimonies of other participants.

Findings and Implications

Ella's narrative brought into focus the Overton Window as a territorialising instrument of institutional assemblages that can control and delimit the engagement of schools with socio-political perspectives. The boundaries controlling the width of this window are part of the explicit and implicit coding of school culture. Awareness of the Overton Window can lead to deliberate and overt engagement with its impact and acts of courage that open this window for all (The Lancet, 2021). Acts of defiance, such as school strikes, the work of student leaders and activist teachers, and the far-reaching impact of Greta Thunberg's voice, can shift the boundaries of this window. I argue that school leadership has the ability and, therefore, the obligation to engage with this process proactively, invite the climate change context into schools and engage teachers and students proactively with this topic, including the political realities that hold back the transformative processes needed to tackle climate change.

4.11 Climate Strikes and the Assemblages of School Leadership

School leadership has a crucial role to play in creating space and building capacity in their schools to engage with climate change education and, to a significant extent, define the milieux of the school. Based on early findings of this research with climate activist teachers and findings from a parallel research project by Ria Bright with student climate strike leaders, she and I published a paper (Everth & Bright, 2022) in which we analysed the reactions of school leadership to the 2019 school climate strikes in Aotearoa and made recommendations to school leadership for engaging with the climate emergency. I suggest that this paper be read in conjunction with this thesis. Here I will sketch some of the key arguments and participant voices from our paper.

The teacher interviews for this study were undertaken during the year 2021 and after the school strike movement inspired by Greta Thunberg had awoken students to their role and power within the climate debate (Jung et al., 2020; Leung, 2020; Murphy, 2021; Nässén & Rambaree, 2021; L. Stone, 2021). For teachers and the leadership of schools, Greta Thunberg and the student climate strike movement altered the educational milieu. It triggered possibilities for lines of flight and deterritorialising events for the students and teachers. It also focused on the actions and the stance of school leadership. The participants reported a range of actions by school leadership towards the climate strikes, teachers who wanted to support their students, and students who wished to engage in these events.

Kwauk (2020) stated that school leadership frequently has a polarising and ambiguous stance towards the engagement with climate change and often frustrates the ambitions of staff and students due to perceived constraints by policies and accountability. In Aotearoa, school leadership, including school governance boards and management teams, have considerable leeway to interpret the state curriculum and to direct structural choices and learning contexts within their schools. However, decades of neoliberal politics have fostered a risk-averse and self-limiting culture focusing on assessment and accountability (Codd, 2005; Wilks et al., 2019). In our paper (Everth & Bright, 2022), we analysed reports from teachers and students about the stance and actions of school leadership during the climate strikes of 2019 through the lens of assemblage theory. DeLanda (2016) emphasizes coding and territorialisation as parameters that determine the behaviour of assemblages. We translated these two parameters into the context of schools and their leadership in regard to the climate emergency. We found that we could divide the schools from which our participants came broadly into progressive and conservative categories and found that conservative schools tended to increase their coding and territorialisation as a reaction to the climate strikes in order to prevent their staff and students from engaging in the strike actions through restricting potential of lines of flight.

However, progressive schools did the opposite: deterritorialised, relaxed coding, and supported staff and students in their engagement with the strikes, thereby turning lines of flight into *lines of exploration* that would bring back and territorialise new knowledge and ways of learning and engagement into the school assemblage.

The participants commented on the reactions of their school leadership during the climate strikes. Participants working in what we labelled as conservative schools reported confrontational, discipline focussed, and territorialising interactions with their school management. **Karl** tried to organise students to participate in a school climate strike event. However, his school management forbade him to do so. Karl said:

> I was told, in no uncertain terms [by his school management], that I was not to advertise that that was taking place on any public forum that the parents might hear about. I was told very specifically, 'no way are you to tell the kids that this is happening or to advertise their involvement. They should be in school' was the answer. (Karl, Interview #1)

Katherine said that her school principal did not want the teachers to encourage students to participate in the climate strikes. However, she went along to the climate strike by striking herself. She said, "I did go on the strike that we had here in Auckland was very exciting. And I had to fight for that. The school didn't really want anybody to do it. But so, I actually went on strike from school as a teacher to do that" (Katherine, Interview #1). **Ella** had a similar experience. She said that her principal made it clear that students had to be at school and dismissed the learning opportunities that the climate strike would offer. She said, "We've got quite a conservative principal. So have we had a meeting where he said, you know, you're not to encourage, like, don't even mention it, don't encourage students to go like, you know, the students need to be at school, learning" (Ella, Interview #1). Like the experience of Katherine and Ella, **Harry** reported that his principal did not allow him to leave his job to attend the climate strikes with his students. However, Harry helped students to make signs for the climate strike march in his town.

Conversely, the leadership of schools we labelled as progressive in our paper (Everth & Bright, 2022) reported positive interactions and encouragement by their principals to utilise the climate strikes as a learning opportunity. These school leaderships enacted deterritorialisations for their staff and students that set them free to explore learning in the context of the climate strikes. In doing so, they enabled meaningful engagement of the students with climate change politics. **Jessica** was

encouraged to take students to the climate strikes and made banners and signs with her class. She took her students to town to meet with the local government officials. She said:

> And I think we had over 150 people from, you know, little green grannies and stuff in the march, for you know, all of the high schools came, counsellors came out, and we had some, you know, challenging discussions with them, and protesting. And so, I think it was awesome for my students because they really expected it to be between the five mates who had bunked school to have a lunchtime to kind of make this work. So, but it was really powerful, I think. (Jessica, Interview #1)

Tanya was encouraged by her school leadership to book several buses from the school to the tow centre to engage students with the climate strikes. Initially, she only booked one bus for her social anthropology classes, but the principal encouraged her to book more buses for other students wanting to go to the strike. She said:

> I booked a bus for my two classes, and then sort of the word spread. And so, you know, we've got students from not just [my] year 13 social anthropology classes, but you know, their friends started saying, you know, could they come, could they come, could they come. So, we're back to the principal. I mean, what if other students want to come? And she was like, the more the merrier. So, we booked another couple of buses. (Tanya, Interview #1)

Freda said that her principal was very supportive of her taking students to the climate-strike protests and that she has not met any roadblocks in this regard. She said, "Our principal was so supportive. If we ask for something, we get it. Like when they are doing any climate rally. If you want to take time off, off you go, have time off, it's free, you know. Go check your banner, you know, that kind of thing" (Freda, Interview #1).

In our paper (Everth & Bright, 2022), we argued that education can become a catalyst for positive change to move society towards potential climate-friendly futures. However, to do so, the generation of agency within educational institutions to change societal attitudes, behaviours, and expectations will be paramount. We here refer to the book *Touchstones for Deterritorializing Socioecological Learning* (Cutter-Mackenzie-Knowles et al., 2019), in which the authors explored wide-ranging aspects of "the radical re-imagining (or de-imagining as they call it) of educational theory and practice … in the shadow of the Anthropocene" (p. 276,278). Educational leaders must lead this transformation of education in the context of what Shields (2013) calls a VUCA world (a world dominated by volatility, uncertainty, complexity, and ambiguity).

I further argued (Everth & Bright, 2022) that the climate emergency and the awakening of societal climate activism constitutes a context for school leadership that currently ranks somewhere between *complex* and *chaotic* on Gilbert's (2015) interpretation of the Cynefin leadership framework developed by Snowden & Boone (2007). Gilbert (2015), in her essay on leadership in collaborative, complex education systems, argued that the climate emergency could not just be a new input into an old system that "will just be colonised to old ways of thinking" (p. 2) and that the required change has to come from "within the system, not from top-down" (p. 9) and from the "interactions between the system's elements – people (teachers, students, school leaders, parents, policymakers, researchers, and so on)" (p. 9). Complex systems constitute a "domain of emergence" (Snowden & Boone, 2007) in which solutions emerge through experimentation that is safe to fail. Shields (2013), citing Denise Caron (2009), argued for transformative leadership that emphasises "not the volatility, uncertainty, complexity, and ambiguity that are givens, but the need for vision, understanding, clarity, and agility" with "foresight, insight, and action" (p. 5).

Findings and implications

Summarising the findings from this research, I suggest direct advice to school leadership and argue that through deterritorialising school culture and a reduction of the often strict coding within the assemblage of schools, school leadership can transform lines of flight into lines of exploration, through which the context of climate change and social change is explored within schools instead of sending teachers and students onto trajectories of flight that sees them 'fleeing' from schools to places where these issues can be addressed. Based on the findings of this research in conjunction with the findings reported by my co-author's research (Everth & Bright, 2022), school leadership has a key role in transforming the enacted educational culture toward meaningful engagement with climate change.

My Reflection: *Perhaps more than any other action that the education system could currently take, working with school leadership by mandating and supporting proactive engagement with the climate change problem could be highly effective in generating and accelerating momentum and agility toward effective climate change education in Aotearoa without waiting for central government organisations to take the lead. After the 2023 election in Aotearoa brought a centre-right coalition into the position to form the next government, hopes for centrally enacted climate change education have significantly diminished, and it will likely fall onto grassroots efforts and the effort of local school leadership to engage in a meaningful way with climate change education.*

4.12 Summary

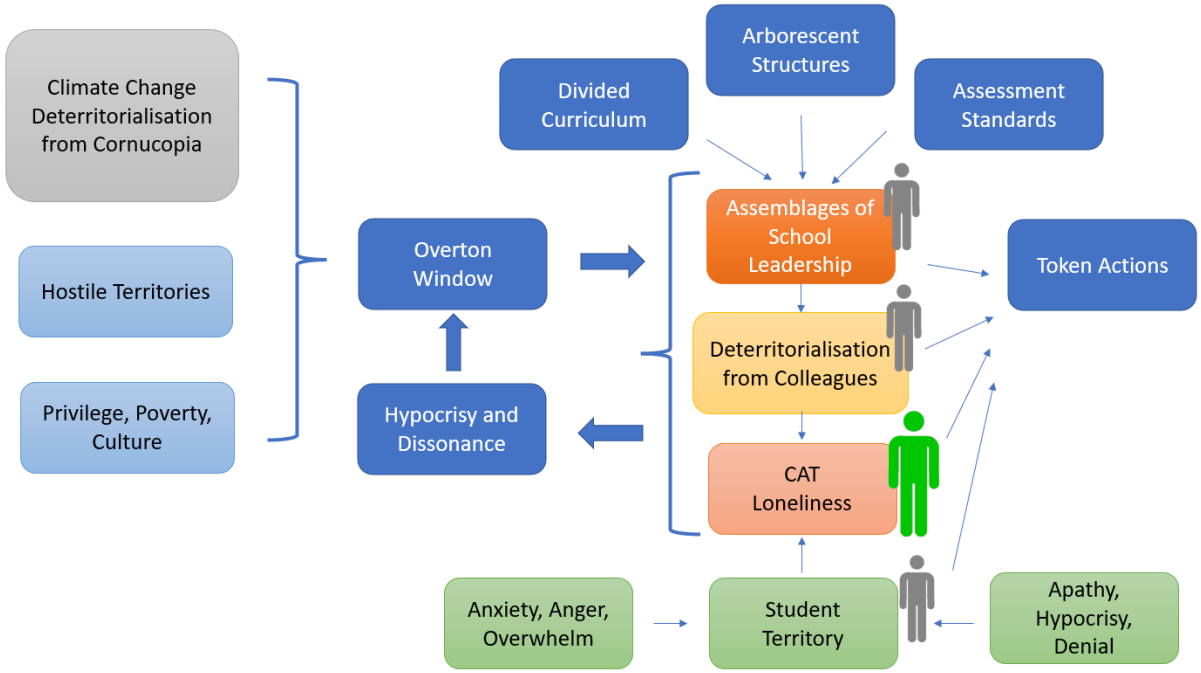
The Anthropocene milieu at the current time, in the early years of the third decade of the 21st century, is characterized by profound deterritorialisations (Colebrook, 2020a). Last century's territory of economic security and prosperity is dematerialising. Modernity's prime enabler, abundant energy in the form of fossil fuels, is inescapably undoing human society's ecological and economic foundations and becoming expensive and harder to obtain. The two-headed hydra of peak oil and climate change is de-energising the growth trajectory that predicated the way society's economic systems are designed to function. In many regions on Earth, these deterritorialisations are already becoming literal. Territories become too hot and dry to grow food and live year-round, while other territories are gradually lost to the rising seas or inundated by a growing frequency of floods and fires. For Aotearoa and much of the Western World, the deterritorialisations are still deniable and virtual, however no less profound. These are deterritorialisations from vital virtual territories, colonised and fought over by our constructed identities, projected trajectories, and mortgaged potentialities, and into which we narrate and commit the aspirations for our children. The deterritorialisations underway in this virtual space have significant implications for education and the teachers tasked to enact it. Colebrook (2020a) emphasises that the existential threads manifesting in the Anthropocene deterritorialisations are "an event where *who we are* is at risk" (p. 349) and rely "on the production of a virtual humanity" (p. 351).

The participants, well-studied in understanding the implications of anthropogenic climate change, perceived the discomfort and cognitive dissonances associated with the deterritorialisations associated with the milieu of climate change education clearly. This milieu includes Kwauk's (2020) roadblocks to effective climate change education and Gifford's (2011) dragons of inaction, some of which clearly manifest in the participant's narratives.

From the participants' narratives, a picture of the milieu they perceive emerges (see Figure 4-5). The participants (CATs, green) emerge as lonely climate change 'worriers', wedged between the students' territory and a system in denial that controls the deterritorialising pressures of the climate emergency through an Overton Window, held narrow through controlling interests driven by hypocrisy and the pain of cognitive dissonances. School leadership emerges in a crucial position of power over the discourse in the school and the mitigation of the arborescent structures of the education system. Token climate change-related actions act as a pressure relief valve to diffuse gathering energies and maintain some form of internal stability. Being immersed in this milieu, the participants voiced desires and evolved strategies to break free. These desires are the focus of the following chapter.

Figure 4-5

The Milieu



5 DESIRE FOR CHANGE - TEACHERS AS NOMAD WAR MACHINES

> The problems that exist in the world today cannot be solved by the level of thinking that created them.
>
> Albert Einstein, as quote in (Prensky, 2009).

The perceptions reported by the participants of this research provided rich insights into the milieu in which they teach. In this chapter, their narratives are thematically arranged and analysed for insights into their self-reflections, desires, and actions for change. Ultimately, these participants want to be change-makers, but they are uncertain about their capacity to do so and are often frustrated by failed attempts. When analysed through the conceptual framework of Deleuze and Guattari, their narratives correspond to the concept of *nomadism* and the vision of teachers as potential *nomad war machines* (Tillmanns et al., 2014). For Deleuze and Guattari (1987), nomadism is a way of thinking and deterritorialised being that contrasts with a territorialised existence within structures of power and establishment and the constraining mechanisms they entail. Goodchild (1996) paraphrased Deleuze and Guattari's concept of nomadic thinking by stating:

> There are no longer any true or false ideas, there are just ideas. There is no longer any ultimate goal or direction, but merely a wandering along a multiplicity of lines of flight that lead away from centres of power. Arborescent models of structured thought and activity are replaced by an exploratory rhizome. Any move of thought or social relation is desirable, so long as it does not lead back into an old or new convention, obligation, or institution. (p. 11)

The assemblage of a nomadic creative mind is a potential change-maker or *war machine* in the language of Deleuze and Guattari (1987). War machines trouble centralised power and the structures of dominance, colonialisation and stratification. Tillmanns et al. (2014) engage with the theories of Deleuze and Guattari from the perspective of Education for Sustainable Development (ESD) and summarise their nomad war machine concept like this: "[a]s war machines can trigger substantial transformation and change, they carry the potential of being an icon of emancipation and creative change within ESD, specifically in terms of shifting neoliberal type ontologies and resisting the global capitalist power of the state" (p. 9). Sidebottom (2021) developed his thesis on re-imagining curriculum development for posthuman times around the philosophy of Deleuze and Guattari and argued that nomad war machines (NWMs) are "mobile agents who operate in 'smooth' non-hierarchical spaces, not the 'striated' zones of the state, where moves are regulated and

bureaucratised. NWMs traverse the boundaries and borders which might constrain them; in this instance, the state apparatus of the education system" (p. 21). Goodchild (1996) emphasised that deterritorialisation and nomadism are not "ends in themselves" (p. 12), but are borne out of the *desire* to enable the actualisation of immanent relations and the construction of social spaces (p. 12). In doing so, Goodchild (1996) argued that NWMs intensify the dimensionality and intensity of relations and draw from the surrounding milieu "whatever they can" (p. 13).

Climate change and the existential threat it comprises establishes a strong desire to change the course of humanity for the better. For educators like the climate activist teacher participants in this study, the concept of NWM seems to be a fitting metaphor for interpreting their emotions, self-images, desires, and actions. While the chapter above illustrated the participants' perceptions of the milieu in which climate education plays itself out, the focus of this chapter is on the desires of the participants, their actions, and their hopes for a transformation of education to make education transformative. In pursuit of this goal, as Sidebottom (2021) argued, nomads detach themselves "from the kind of thinking that prioritises loyalty to the organisation above loyalty to the self and others" (p. 21). In fact, when it comes to the existential threat of climate change, loyalties lie foremost with the preservation of the ecosystems of our planet and the existence of civilised humanity.

A key concept of Deleuze and Guattari (1987) is the notion of *lines of flight* along which nomad war machines enact change. Lines of flight are paths along which assemblages are transformed or are transformative or creative and along which deterritorialisations and reterritorialisations progress:

> The assemblage that draws lines of flight is [...] of the war machine type (pp. 229). D[eterritorialization] is absolute when it [...] brings about the creation of a new earth, in other words, when it connects lines of flight. (Deleuze & Guattari, 1987, p. 510, as cited in Tillmanns et al., 2014)

In the following sections, selected participant narratives are thematically interpreted through the concepts of desire, nomadism, and lines of flight. I argue that the participating teachers show signs of nomadic thought and desire to become change-makers in the education system. I further argue that their desire remains frustrated by the territorialisations within the education system that are designed to maintain the current system and its endemic restraints of individual teacher agency, with significant consequences for the ability of the system to explore new directions.

5.1 Introspections: The Self as a Source of Desire

The first node of this part of the rhizome looks inward. It reports on a selected group of participants' introspections about themselves as subjects, teachers, parents, and community members. Following the initial unstructured interviews and a structured questionnaire, the participants were invited to conceptualise themselves and their school or teaching situation as assemblages in a drawing or diagram (see also section 3.3.8). Only general instructions were given about the nature of assemblages, and a possible way to conceptualise assemblages graphically was provided. I refer to Appendix B for the email communication that invited the participants to take part in this activity and Chapter 3.3.8 for the introduction of this method. Here, a selection of five participants' drawings of themselves are presented. A sixth assemblage drawing by participant Sarah is presented later under the topic of Nature Connectedness. Ella submitted a combined drawing depicting herself and her work environment, which has been presented in the previous chapter due to the relevance of her drawing to the milieu analysis (see section 0).

The method of using assemblage drawings as talking points resulted in a prior publication (Everth et al., 2022), and some of the discussion of Brent's drawing below (Figure 5-1) is cited verbatim from our paper with permission from the journal. The methodology is of interest, and comments on this method are made in our paper.

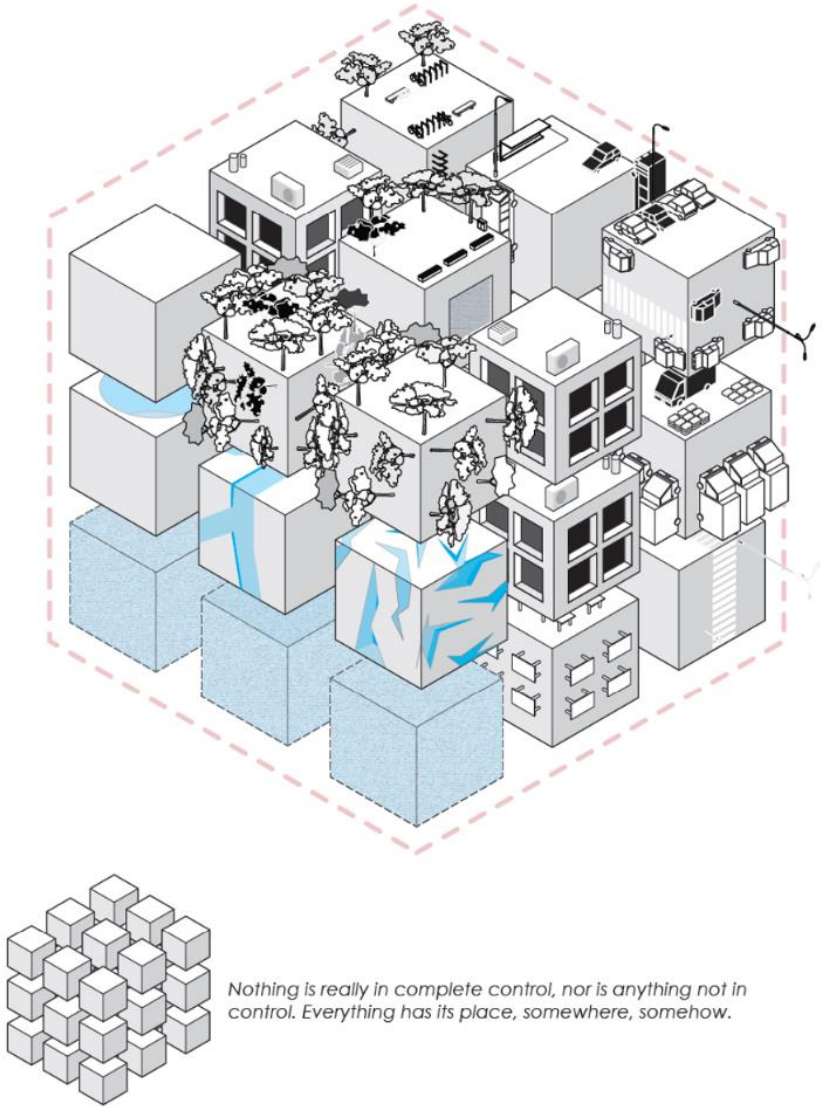
5.1.1 Brent's Posthumanist Assemblage of Himself

Brent is a beginning technology teacher in rural Aotearoa. He is highly motivated, well-versed in using digital design tools, and conscious of the climate and sustainability crisis. As a beginning teacher, Brent is still full of enthusiasm and energy to change the world through his teaching. When asked to conceptualise himself as an assemblage, Brent produced a detailed drawing (Figure 5-1). Brent had not been introduced to posthumanist ideas through the research, yet his self-portrait as an assemblage appears to relate to posthuman visions. Brent's drawing emphasises his connections to the world around him.

Brent's drawing (Figure 5-1) and the following paragraphs discussing Brent's drawing and his commentary about his drawing were published prior in Everth et al. (2022, p. 11) and are republished here with the permission of the journal.

Figure 5-1 - Brent's Assemblage Drawing of Himself

Brent's Assemblage Drawing of Himself



> There were so many elements to my existence and connections, and I didn't feel the more generic way of doing an assemblage[23] worked for that reason. And it just becomes very convoluted. Just where am I *not* connected? (Brent, Interview #2)

Fox and Alldred (2021b) state that posthuman perspectives understand humans as an integral element of the environment. Brent sensed that connectedness to everything else was central to his posthuman

[23] Brent's reflection on "the more generic way of doing assemblages" (Brent, Interview #2) refers to often-seen two-dimensional assemblage drawings in the form of concept maps.

self-image. Yet, Brent was conscious of the fact that there is more to the self than its external connections and environmental entanglement. He said:

> Where could you find me if you needed to find me in the world? And that's kind of what that system entails. It's just, it's just, you know, I'm connected to something. But what's that something, and then it kind of goes into this third tier of interconnectedness. And that's both my transport of myself, transport of the things that come to me, and the transport of things that go from me to something else. (Brent, Interview #2)

> There is something in the centre, but you're not quite sure what it is. And I think that's why that view works quite well. There's stuff that you see. And that's the obvious stuff, and then stuff you don't see. In a system like a school, a lot of that stuff is obvious and has to be obvious because, at some point, you might need to interact with it. Whereas an individual self, there are certain things that you may not want to know about, but you need to know about in some way, shape or form. And there's an underbelly to an individual self. And that's, that's, that's a hard thing to deal with when you put the assemblage together. (Brent, Interview #2)

My Reflection: *Brent's ideas resonate with a central struggle for me. My awareness of the existential crisis that humanist hubris, colonialism, and imperialism brought about – the fruits of which shaped me as a member of a probably unsustainable middle class – resulted in self-doubt. What remains of myself, once the old bastions of self-making, humanist idealism and exceptionalism are deconstructed by the global ecological and humanitarian trainwreck 'we' are causing? Who am I then to be? How and from where to teach and sustain hope when the flourishing posthuman utopia I may wish to evoke seems to recede further from the grasp as war, social deprivation, ecological tipping points, and the daunting scale of a transition to a post-fossil fuel world are daily headline news?*

Brent touches on a fundamental grappling with subjectivity in posthuman theorising and the possibility, as Callus (2012) argued, for "reclusiveness and the refusal of relation" (p. 293) that permits the placing of oneself "outside the minimal relation of being perceived by the other" (p. 293). Brent talks about the 'underbelly' of the self, which may wish to recuse itself from the posthuman pervasive relations to the other-than-self. Among all the connectedness and integration with the other-than-self, how does posthumanism define the self? Braidotti (2019a) suggested that it is "inappropriate to take the posthuman either as an apocalyptic or as an intrinsically subversive category, narrowing our options down to the binary: extinction-versus-liberation (of the human). We need to check both emotional reactions and resist with equal lucidity this double fallacy"; furthermore, the posthuman does not *erase*

differences between those who are coded as human; the "post-power/gender/class/race/species relations" (p. 35) remain. What the posthuman offers is a more integrated *knowing subject*, who is "no longer the liberal individual, but a more complex transversal ensemble: of zoe/geo/techno-related factors, which include humans, as collaboratively linked to a material web of human and non-human agents" (Braidotti, 2019d, p. 1186). However, understanding our role(s) within this knowing subject is not easy to intuit. Where is the self situated as a distinct, valued, unique entity? Brent sees it as hidden, like the invisible central element of a Rubik's cube:

> It's like a multi-dimensional cube. You can move anywhere in the cube because there's no nowhere, but there's always a somewhere. You can always go from one corner to another, with as many or as few connections as you want. And I think that for me as an individual, this assemblage spoke clearly to me. (Brent, Interview #2)

> And then I've kind of got this kind of central archway, which is more of my lived experience. And that's things like, where do I work? Where do I sleep? Where do I cook? Where do I eat? Where do I get stuff from? Where do I hang out? Who do I meet? Where do I meet them? And all sorts of those more surface-level civilisation things. And those, again, these are things that you always see, but there are things underneath that you don't quite understand how things get to me. This is this tension. It's a very simple system. But it's a very simple system designed not to let you know what's going on. And I think that's where that quote [below] connects for me. (Brent, Interview #2)

As Brent included in his drawing, "Nothing is really in complete control, nor is anything not in control. Everything has its place, somewhere, somehow".

> And that's where I like kind of sat and just looked at it, and I was like, hang on a moment. There's nothing really important in the system. Like if I disappeared from the system, it would be okay. If one of those things disappeared from the system, it would probably be okay. But if you removed a whole line of it? If you removed a whole section of it? And I feel like the answer is yes. It would just get replaced with something else. (Brent, Interview #2)

In a posthuman world, does the individual person become replaceable like a leaf on a tree? Henriksen et al. (2021) problematised individualism in posthumanism and argued that when rethinking creativity in posthumanism, even "creativity becomes not an individual and isolated process but a blossoming through the mutual connectedness of mind-body and body-ground" (p. 4). This connects to Blenkinsop et al. (2017), who wondered about *Freedom & Flourishing in a Posthumanist Age*, and with respect to

the identity of teachers, eloquently invoked Camus' novel *The Plague* as an analogy to "the absurdity of teaching in a time of ecological crisis" (p. 593). The authors discussed the play's character Dr Rieux as an incarnation of an "environmental educator who enacts the rebellious paradox of negation and exaltation" (p. 593) and evolve the roles of teachers as witness, artist, and rebel. Reflecting about himself, Brent wondered about his role as a climate activist teacher:

> And that coming from a climate, I guess, activist teachers sort of, kind of, going into my first year, what do I teach people? What do I let them know? What do I let them know is important? As an individual from doing this assemblage, I realise that you're possibly not that important in a system that's designed around having lots of you and the system very much is designed around having lots of me. And I noticed that straight away once I put this together because it's a visual version of it. You can see it. You can feel it. (Brent, Interview #2)

Here, Brent realises the semiotic powers emerging from his drawing. The ideas that brought this drawing about now become palpable through their realisation as an artefact to himself. Brent reflected in a later interview on the assemblage drawing engagement as an important element of his awareness building. However, Brent's main questions remain unanswered, for himself and likely also for many teachers who wonder how to teach in these times.

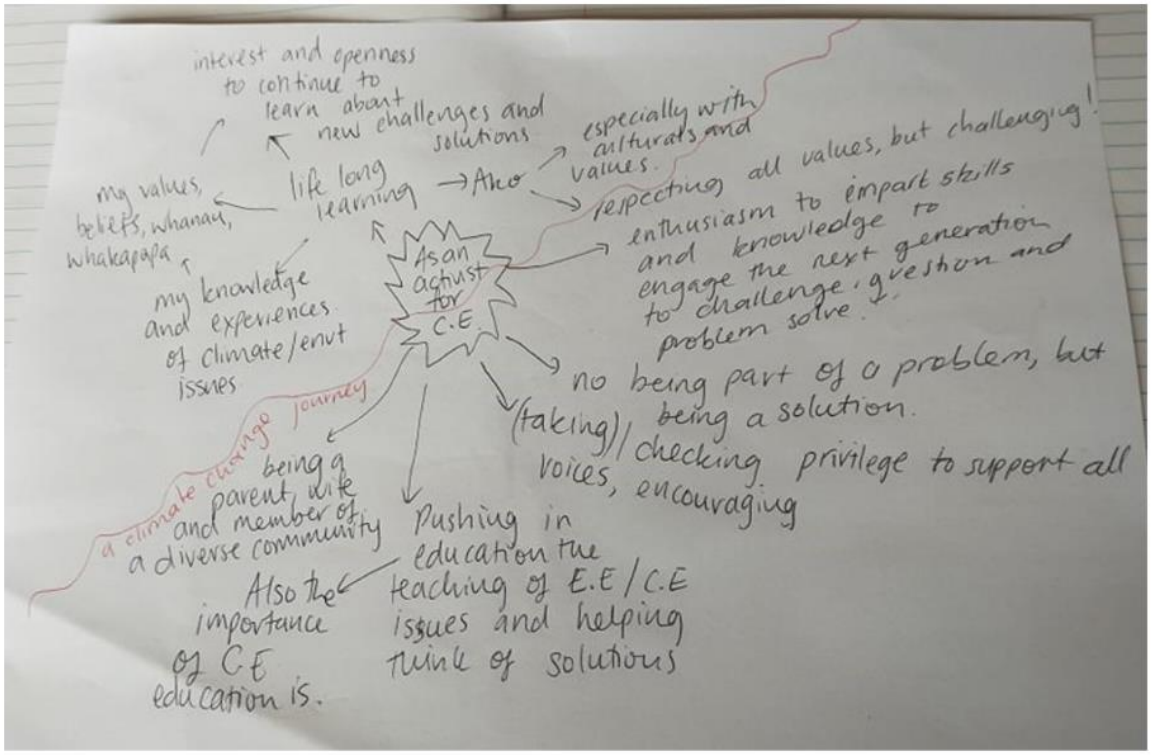
5.1.2 Jessica's Assemblage of Herself

Jessica said that she found the personal assemblage drawing tricky to do (Figure 5-2). She pointed to the red squiggly line that diagonally crosses her drawing and explained that "it was quite deliberate because it's sort of a, yeah, it was sort of my climate change journey, which I mean, I guess I feel I know quite a bit about" (Jessica, Interview #2). Jessica explained that "we are lifelong learners" and that the centre "spiky little bubble" (Jessica, Interview #2) is where she thought of herself to be, halfway along her climate change journey. She explained the spikiness by saying that she is very passionate about climate change and is "occasionally prickly" (Jessica, Interview #2) while trying to be respectful without shying away from disagreement. Her red journey line, she said, is wiggly because of the many ups and downs and with times when "you actually just need to think about other things" (Jessica, Interview #2). Jessica said that the journey line connects her with her core beliefs, her community and whanau [family], and her knowledge and experience while signifying openness to connect to new learning. The lines from her centre star to the constituents of the assemblage are lines of power relationships in which she sees herself successfully pushing the education system in the right direction.

In contemplating her climate change journey line, Jessica emphasised the relationship between new learning and existing ideas. She talked about the issue of shifting baselines when new ideas about a new topic enter the brain. Jessica thought that when people encounter some new idea, what they hear first quickly becomes their baseline for the new topic. She mentioned Covid-19 information and misinformation and how often people form baseline-building values on the first encounter with new information, which then become hard to shift later. Jessica thought that struggling consciously with these baselines in peoples' ideas about something is an important part of teaching and learning. She said that "ako learning" (Jessica, Interview #2), which she explained as reciprocal learning, especially around cultural values and respect, is being strongly fostered at her school at the moment.

Figure 5-2

Jessica's Assemblage Drawing of Herself



Jessica emphasised her engagement in questioning if she is part of the problem or part of the solution and always striving to be part of the solution, which, as she said, can drive her friends crazy, who often just want to debrief at her ear without doing something about the problems they bring up. Jessica sees herself as a "relatively wealthy white woman" (Jessica, Interview #2) with privileges. She realises that comes with its own issues and said, "It's tricky, isn't it? I have the time and a little bit of money to be able to do things to kind of, you know, support the environment and, and the climate emergency

and I should use them" (Jessica, Interview #2). Jessica hopes to encourage others with what she does. However, she is disheartened that she was alone at her other [previous] school, where she felt that it was just her trying to encourage the school to "respect and support the climate, environmental emergency, I guess, and help with thinking of solutions around our school environment in the teaching and learning of that" (Jessica, Interview #2).

> My Reflection: *I can relate to Jessica's sentiment of feeling alone as the one at the school who wants to take climate change education seriously. And I have also often reflected on whether climate change and environmental activism is the privilege of people with a middle-class lifestyle and with spare cash and time at hand. There is a risk of normalising this experience and normalising expectations that society at large should also act towards solving the climate crisis, when, in fact, many people do not have the capacity to do so and are overwhelmed with just getting food on the table for their families. I see social inequality as one of the most troubling aspects of climate change mitigation and adaptation planning.*

5.1.3 Jacob's Assemblage of Himself

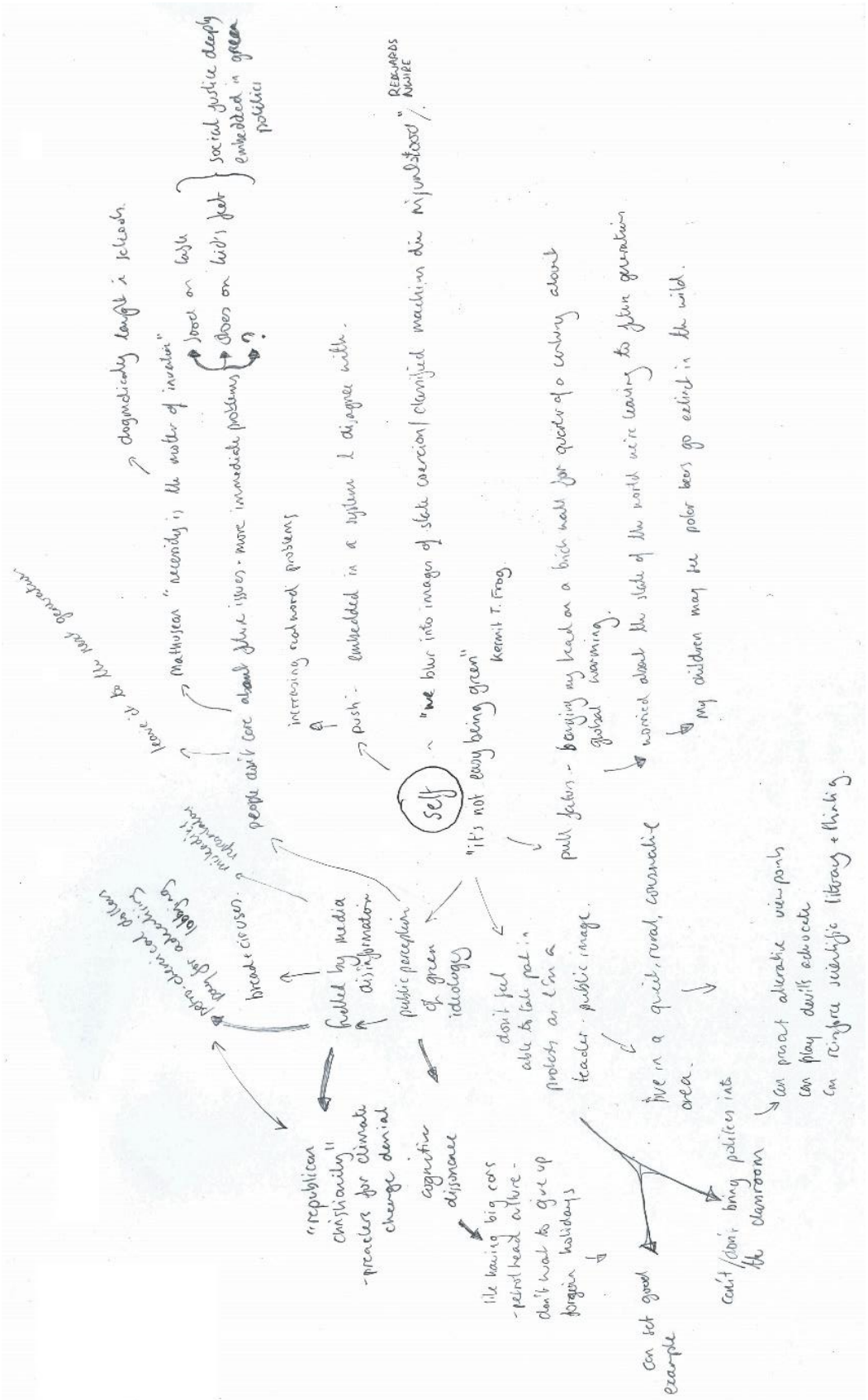
Jacob provided a detailed assemblage drawing of himself (see Figure 5-3). He placed the self in a circle at the centre of the drawing and cited Kermit the Frog saying, "It's not easy being green" (Jacob, Interview #2). Jacob explained the analogy to the Kermit quote in relation to the school system:

> I think when he was talking about 'it's not easy being green', he was talking about it not in a political sense, but in a sense that he felt different. And it would be a little bit disingenuous for me to say that I really identify with Kermit the Frog at times. But the idea that if you think differently, or if you act differently, it sets you apart from other people, it's quite a hard one for a lot of people to manage. So, they don't think differently. You try and fit in as a teenager, you try and fit in, you know. You try to be a good little sausage in the sausage factory, and you go through school. (Jacob, Interview #2)

Radiating out from the 'Self', Jacob placed arrows. One, going down, links to factors that pull him towards action. He wrote that he has been banging his head against a brick wall about global warming for a quarter of a century. He is deeply worried about the state we leave the world in for future generations and that his children might witness polar bears going extinct in the wild. Going upwards to the right, Jacob feels pushed by being embedded in a system he disagrees with, which produces increasing real-world problems.

Figure 5-3

Jacob's Assemblage Drawing of Himself



To the left (see Figure 5-3), Jacob links his self to the problematic situation as a teacher living in a conservative, rural community and the fact that he feels unable to participate in political protest due to the public image of a teacher that can't and shouldn't bring politics into the classroom. However, he sees himself as being able to present alternative viewpoints, play devil's advocate, reinforce scientific literacy and thinking, and give a good example to others.

Jacob links to the left of his centre self to the public perception of green ideology, which, as he put it in this drawing, is fuelled by media disinformation paid for by petrol dollars and influenced by industry lobbying. He pointed to the cognitive dissonance generated by having big cars, promoting a petrolhead culture or foreign holidays and by what he put as "Republican Christianity" and the preaching of climate denial[24]. Jacob sees himself in some form of conflict with the school system and, as he perceives it, its "sausage factory" behaviour that is neither good for teachers nor for every learner. The system, as Jacob put it, tries to push square things into square holes and "if you're trying to do anything different, or you're trying to be a round peg in a square hole, the system doesn't like that" (Jacob, Interview #2) and instead pushes you into "certain strata" (Jacob, Interview #2), which makes it "difficult for people to care about problems such as climate change that they see as abstract" (Jacob, Interview #2). Jacob realises that many parents need to care about having the money for their kids' next pair of shoes when it's still a few days to the next payday, "and the only food in the house is, you know, half a stale loaf of bread or something" (Jacob, Interview #2).

Like Jessica and Ella, Jacob pointed to social inequality and the lack of headroom in families' budgets as a key hindrance to considering climate change-related decision-making or developing care for matters unrelated to short-term survival and stability. His self-image as 'Kermit the frog' is a testament to the pressures he sees himself under, between the weight of the climate change matter, the difference-eliminating school system, and the social realities in his town. Jacob's thoughts are wandering and searching in a nomadic fashion. The food security issue that Jacob pointed to is very real (Macaulay et al., 2023). According to the Ministry of Health (2019), almost one in five children in Aotearoa lives in a food-insecure home, and most teachers in Aotearoa know students who come to school without breakfast. Many schools have therefore organised 'breakfast clubs' to make sure that food is available before learning starts.

[24] Jacob referred to the reported link between climate denial and Christian beliefs within the right wing / Republican political domain the USA that he said he was aware of (Walker, 2023). These mindsets are finding to a lesser degree resonance within similar political circles in Aotearoa (Milfont et al., 2015).

5.1.4 Kelly's Assemblage Drawing of Herself

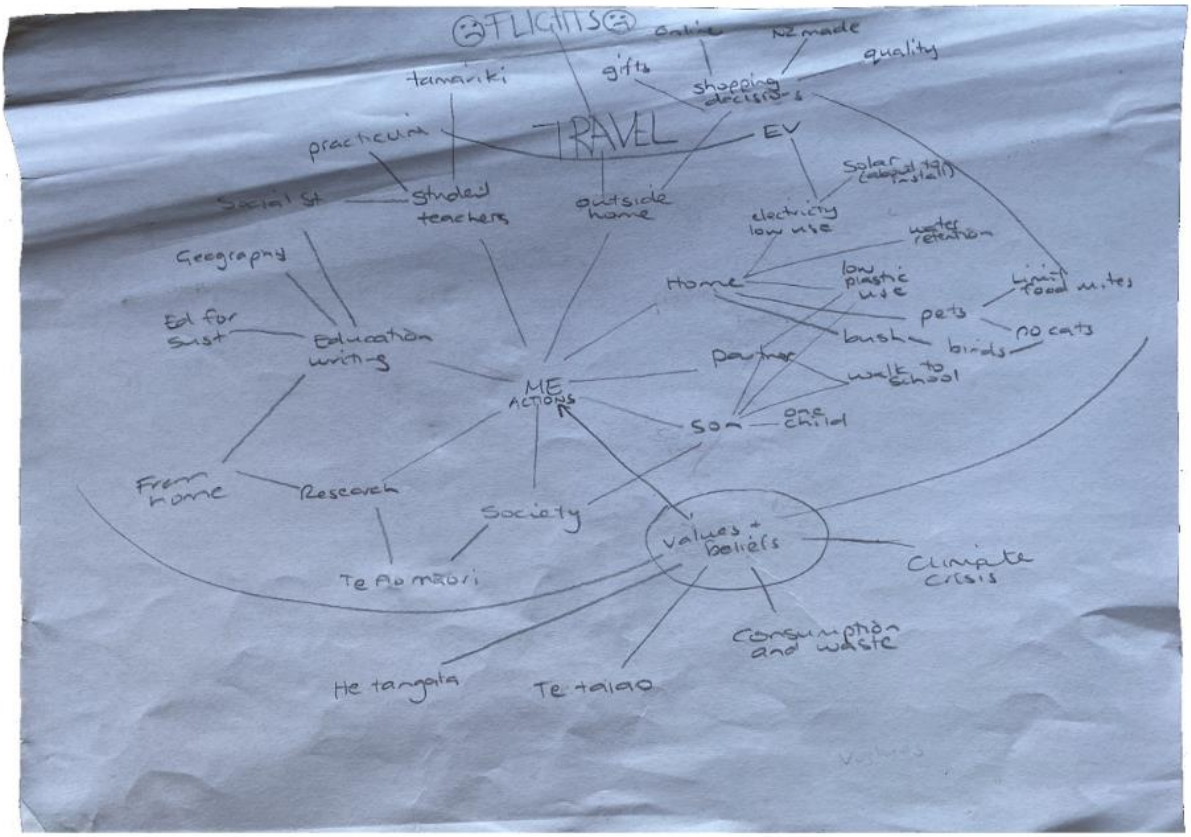
Kelly explained that her values and beliefs are at the core of the assemblage she presented (Figure 5-4). Kelly indicated this with the strong arrow leading from the values and beliefs to the 'Me' in the centre of the drawing. Kelly's drawing captured that these values and beliefs are an externality to her assemblage of herself, and their affect crosses the assemblage boundary inwards. Kelly explained in the interview about this drawing that her values and beliefs are strongly connected to her Christian faith, which she did not explicitly state in the drawing.

Kelly placed Te Taiao (the environment), He Tangata (the people – society), Consumption and Waste and the Climate Crisis as externalities outside of her Values and Beliefs bubble, indicating that her relationship to these externalities appears to be governed by her Values and Beliefs, which act as a territorialising, governing, instantiating, and protecting agency at the border between herself and the world beyond. It could be argued that her system of values and beliefs acts like an Overton Window (Mackinac Center for Public Policy, n.d.; The Lancet, 2021) with respect to herself. See the explicit discussion of the Overton Window concept in the previous chapter (5.12).

Speaking to the way the climate crisis affects and connects with her, Kelly explained that "If I had to, kind of define what it is, the way in which I consider things is through a lens of consumption and waste, rather than going bigger to think of climate crisis" (Kelly, Interview #2). Kelly emphasised that she recognised that this was "probably a really important differentiation there" (Kelly, Interview #2). This connects to Kelly's focus on action that she can take in her immediate field of influence. Consumption and waste are two actionable areas in peoples' lives linked to climate change emissions. Kelly explained that going outward from the 'Me' centre of the drawing are her outward-directed action lines. These lines connect to her immediate family, the home, her place of work and her research and can be seen as lines along which her desires and actions "play out" (Kelly, Interview #2) to reduce waste and consumption. She placed a sad face around her personal travel due to flights she needs to take for work reasons between some of the centres in Aotearoa, but she highlighted that she uses an electric car for all her local travels.

Figure 5-4

Kelly's Assemblage Drawing of Herself



Kelly emphasised that she and her partner are on the same wavelength regarding climate change and environmental concerns. The couple is raising a child who is fascinated by cats. However, because they live near the bush with Kererū (native bird) coming to visit their terrace, cats as pets are not appropriate. Raising a child, Kelly said, makes it necessary that "you try and make certain you're explicit so that they can be brought up in a world that strongly has similar values and beliefs" (Kelly, Interview #2). Kelly reflected on her family's situation as an upper-middle-class member, allowing her to make conscious decisions on consumption, waste, and environmentally conscious behaviour.

> I am in the really privileged position that I get to make those decisions because I get to sit in my lovely home at my lovely desk. And I'm Pakeha, middle class, and I am well educated and have a good job. (Kelly, Interview #2)

Kelly reflected on the fact that her decisions and actions might be very different if this was not the case and that she might have to prioritise family over the environment if she was not economically safe. Kelly's reflections, just like those of Jacob and Jessica, pointed again to the desire of teachers to see issues of equity, social stability, and social justice addressed as crucial ingredients of climate policy

development and as a condition for people's ability to engage in a meaningful way with climate change.

Findings and Implications

Asking the participants to draw themselves as assemblages opened a window into their perceptions of themselves as teachers in the climate emergency. The drawings revealed connections between the multiplicities of representations of the world in the participants' minds. The assemblage perspective emphasises agential flows and their capacities to affect. This interaction was productive as a method, and the participants remarked on the high value they saw in this activity for themselves. Brent said this engagement was the "total highlight of my past year" (Brent, Final Interview). For an in-depth discussion of this method and the semiotic capacity of such drawings, I refer to our earlier publication (Everth et al., 2022).

Scanning the literature on climate change education, the focus is clearly on students and curricula. However, teachers mostly appear as impersonal operatives in the education system and their inner states of being and their self-perceptions and identities are rarely interrogated. Teachers are all too often equated with the role they fulfil, the curriculum they perform, or the student inspiration they are supposed to provide. However, as Jacob summarised, "It's not easy to be green" (Jacob, Interview #2). A recent study on climate change effects on mental health in the workplace (Brooks & Greenberg, 2023) found that teacher burnout was associated with environmental disasters and lamented the "paucity of research focusing on how climate-induced mental ill-health can impact on workplace behaviours" (p. 135). Listening to climate change teachers' deep introspections and giving them the capacity to generate and sustain genuine hope in light of the climate crisis through dedicated training could lighten the emotional labour they are required to perform (Swim & Fraser, 2013).

As one implication of the participants' introspections, I argue that further research should focus on the inner state and mental health of climate activist teachers and what support they will require. The professional burden of being the mediator between a climate change-altered and deteriorating reality and the hopes and aspirations of their students is significant. If climate change is increasingly considered as a mental health matter for the public (S. Clayton, 2020; Sciberras & Fernando, 2022) and, in particular, the youth (C. Hickman et al., 2021), these concerns would seem amplified for teachers tasked to be the mitigator of youth development and wellbeing.

5.2 Desire to Deterritorialise Institutional Assemblages

The focus of the previous section was the introspection of the participants based on the specific task of drawing themselves as assemblages. The data underpinning the following sections are coming from participant interviews, as indicated in the quotations of their statements. The focus is placed on the participants' desires for change in the assemblages of educational institutions toward embracing climate change education and the strategies they employed to promote this change. The participants reported on their desires to explore new territory and shift culture along lines of exploration. However, for most participants, existing educational assemblages, school organisation, departmental territorialisation, timetables, and curricula hindered their nomadic explorations and held them back from enacting meaningful climate change education. These desires are mirrored by arguments in the literature about roadblocks to climate change education, e.g. (Kwauk, 2020; Rousell & Cutter-Mackenzie-Knowles, 2020; Santone, 2018).

5.2.1 Desire to Deterritorialise Faculties and Curricula

The NZ curriculum (MoE, 2007) is territorialising learning into distinct subject areas, which are replicated as institutional structures in the form of faculties at most high schools. Large schools, in particular, have a nested network of faculties and departments together with tiers of management. Most participants commented on the fact that climate change education is by its nature a cross-curricular endeavour and cannot be simply attached to an existing subject area such as science. Tackling climate change involves a reorientation of what it means to be a responsible citizen. The desire to work toward a deterritorialisation of faculty and curriculum silos in schools was expressed clearly by many participants.

Freda complained about the lack of attention to climate change in the curriculum. She said:

> I don't think that the New Zealand curriculum has, well, it's very, it's not aligned with climate change to start off with, it's not got it interwoven through it. It's not part of it. It's not teaching our students to think about it in relationship to organic chemistry, or combustion, carbon dioxide, you know, that's not in there. That's something I mention, you know, but it's not on there. (Freda, Interview #1)

Freda continued by arguing that in Grammar Schools[25] like hers, there is intense pressure on students to excel in their academic subjects based on their parents' expectations for them to enter high-paying career pathways. Freda said, "So we end up with a lot of pressure to just shove the curriculum down

[25] Grammer Schools are traditional schools with a strong academic focus. Thy are generally located in larger cities and draw students from homes with high aspirations for their children.

their throat so they can pass an assessment, and any time spent off the track is potentially damaging their future" (Freda, Interview #1). This pressure prevents Freda from enacting the teaching she desires to deliver.

Karl emphasised his desire to see climate change and citizenship education combined with science and politics and education in critical thinking:

> So, as a teacher, what I would say is, climate change should be directly in the curriculum, obviously. It should be in the curriculum loads. It should be in different parts of the curriculum. We should be talking about the politics of it. We should talk about critical thinking. Critical thinking should be in the curriculum. The very strong correlation between politics and science should be in the curriculum. We should be teaching our kids how to be good citizens, as opposed to how to memorise a lot of stuff. (Karl, Interview #1)

Karl thought that education should move from acquiring knowledge to learning how knowledge is gained and how to analyse the validity of knowledge critically.

Nora agreed with Karl's views and emphasised the need to include politics. She wished climate justice would be a significant part of climate change education.

Ella said that she is integrating the subject of climate change into her art courses. She teaches a course in design with a focus on architecture, where she focuses on urban designs for a climate-altered world. She said the topic was very motivating for her students, and the class investigated floating cities on islands that were interconnected. Ella said, "it's really interesting. And the kids got into it" (Ella, Interview #1).

Sarah connected social science, biology, English, and the health curriculum with climate change and Māori cultural studies and found this to be really effective. She is deterritorialising the NCEA achievement standards creatively, see also (Everth, 2022b), and said, "We're very lucky with the NCEA and the curriculum. We can mould concepts and ideas to fit different philosophies" (Sarah, Interview #1). Sarah said she worked together in collaboration with other teachers. "Instead of labelling a topic, you know, climate change, we use more contextualised ideas from the students. So, what I mean by that is they [the students] are coming up with issues or ideas that concern them and then we're weaving that together with the subjects and the community and the curriculum" (Sarah, Interview #1). Sarah's dream is to find a "bush school" where all subjects are taught together towards making sustainability the focus and where the human-nature relationship is interwoven through the entire curriculum. She believes that sustainability thinking will become part of every career pathway. Sarah

thought that students "need to know that the climate emergency links to everything that they're learning and that they can go on past high school and be involved in the change". She thought students need to see "how a sustainability team works in a big company" and to learn how important excellent communication skills are to voice ideas (Sarah, Interview #1).

> My Reflection: *It seems that Sara was well supported by her school and colleagues and was able to wrest some control from the NCEA assessment system in a similar way as I advocate. It shows that teachers who are well supported in their schools can make progress in deterritorialising the standardised assessments. (Everth, 2022b)*

Harry believed climate change is a cross-curricular matter. He said, "It's not just an Earth and Space science job. It's physics, biology, chemistry, and social science. It's really an all-teachers job to go through this. It's not just scientists, people, the general population, are starting to think, you know, what we need to take some action" (Harry, Interview #1).

Claire was teaching English. She believed that this was fortunate because English is a skills-based subject, and these skills can be applied to 21st-century issues such as climate change.

> So, I'm quite fortunate in that our programme is really a skills-based programme rather than a content [based programme]. So, we get to choose our content, or the students can often choose the content, and we're really focused on developing the skills of literacy, critical thinking, you know, presenting, you know, reading that kind of stuff. So, in that way, you were able to kind of guide the students to sort of important 21st-century issues. (Claire, Interview #1)

Claire used texts such as the book *The Children of Men*, a dystopian novel, as material to discuss politics, economics, sociology, and the plight of refugees, with implications for the climate change topic that potentially crosses many faculty areas. Claire reported that other staff at her school also support greater cross-curricular engagement. However, she said that teacher workload, which she characterised as "ridiculous", is a massive barrier and contributes to teachers remaining siloed in their faculties. Claire said, "People [her colleagues] are struggling enough to do what they do on a regular basis. So, they're certainly not looking to try anything new" (Interview #1). But she remains hopeful that "as this generation grows up, they will become more and more active in making their passions part of their work. So yeah, there's lots of work to be done. And it's just not allowing those barriers to stop us, really" (Claire, Interview #1). Claire hoped to start a cross-curricular and extra-curricular environment group at her school and said she had some very keen students. She thought all students

should include meaningful community engagement in their assessed and graded work at school instead of the 'credit farming' currently happening in siloed subject areas.

Moana reported on her school's integrated and cross-curricular learning and highlighted the importance of management support. She highlighted the 'Whanau-based' (family-based) learning at her school:

> Basically, the programme is integrated, so there's no English or Maths class. It's all sort of project-based inquiry learning. And within this space, you have about three staff members to 50 learners. And they do have specialist teachers that come in, but the programme is set out so that it's all integrated. And there's a strand of kaitiakitanga through that programme across all the whānau. A little bit like houses. (Moana, Interview #1)

5.2.2 Gentle Infiltration as Nomadic Strategy

Jessica spoke of "gentle infiltration" (Interview #1) of anything she teaches with messages of climate change and sustainability: "So yeah, in terms of being an activist, I can be loud and obnoxious, and I can be opinionated. If I think of the word activist, I often think of that high-end. But as I get older, I reflect that actually, you know, just gentle infiltration is really important as well, and invocation and education. So, a little bit of titbits here and there, and every little bit counts" (Jessica, Interview #1). Jessica thought climate change is such a "massive" subject that it is too much for many people to take on. But she believed that every little bit we can do counts. Jessica said that if she manages to get at least a "little bit stuck in 10 of them out of 40" (Jessica, Interview #1), then she has created something in the students' brains that one day that will resonate with them. "Infiltration", Jessica thought, is a really nice word.

> My Reflection: *Jessica's concept of gentle infiltration conforms with my personal view that revolutionising education to achieve a systematic response from the school system to climate change will take far too long and may end up canalising energy into restrictive and inflexible state-prescribed curricula and assessments, which will once again be inflexible to respond to the rapidly changing dynamics of the climate emergency. It may be more effective to 'infiltrate' teaching in the current subject areas with climate change and related social change contexts. This would include infiltrating assessment tasks and student assessment projects with related contexts. Such infiltration could be organised, encouraged, or even required by school leadership, willing to use their power of direction to bring climate change education into the daily life of schools. Gentle infiltration may become a successful*

and readily applicable strategy for the rapid enactment of climate change education at schools. In my own teaching, I had undertaken this route with abandon to bring environmental education with a bend towards climate contexts into my teaching praxis. I ran into conflicts with state-run external moderation systems that flagged my work as not fitting the restrictive blueprints of state-directed assessment moderation. However, upon appeal, I prevailed each time.

The 'Gentle Infiltration' strategy appears to be typical for nomadic styles. Nomads transgress the territories of others and take sustenance from local resources and knowledge while leaving behind a trail of influence and cultural inoculation connecting to faraway lands. Munro and Thanem (2018) described the nomadic tactic as occupying territories not by "striating it and distributing themselves within it, but by the multiple affective ways in which they occupy it. Being capable of appearing anywhere upon it, they turn it into a 'smooth space'." (p. 73). The 'smooth space' is a space in which nomads move with ease, transgressing strata and constructs and turning the world around them into a space free of constraints. Bringing the good side of this nomadic spirit to work, teachers as nomad war machines can make the education system flexible and responsive to the accelerating impacts and dynamics of climate change and the demands on society to respond creatively to the challenge it poses.

5.2.3 Desire to Deterritorialise Assessment Praxis

As discussed in section 4.9.2 above, the participants cited the territorialisation of learning and assessment through the standardised NCEA system as a significant concern within the perception of the milieu in which climate change education needs to come into being. This dovetails with my own perceptions and experiences as a secondary school teacher. Naturally, the participants commented on their desires to deterritorialise this system.

> **Kelly** complained about the many competing demands for time and that it would need approval by NZQA to refocus learning and assessment on climate change. **Kelly** added, "NZQA could make it easier to make adaptations to courses/programs so that we can move with the times, i.e., apply best practice and research to our offerings. Kaitiakitanga could be prioritised more by the Teaching Council as part of its bicultural and Te Tiriti o Waitangi commitments" (Kelly, Questionnaire, Q7).
>
> **Anne** thought that "NZQA needs to look beyond essay or portfolio type external assessments. These do not fit with cross-curricular project-based learning that is used in many EfS [Education for Sustainability] programs" (Anne, Questionnaire, Q8). Here

Anne refers to the specifics of assessment directives and how they get in the way of creative and cross-curricular work that Anne thought is best suited for grappling with the climate change topic.

Jacob suggested making "significant changes to NCEA to make it more future-focused and based on real-world problem solving" (Jacob, Questionnaire, Q7). Jacob reflected on the coming changes to the NCEA assessment framework (MoE, n.d.-b) and thought that "the new curriculum and L1 stuff that's coming in is a step in the right direction" (Jacob, Questionnaire, Q7).

Claire complained about the siloed structure within the NCEA system and said she hoped to "change the structure of NCEA to accommodate less siloed approaches" (Claire, Questionnaire, Q7).

It should be remarked here that the NCEA system is currently undergoing a major review (MoE, n.d.-b). This review aims to simplify the NCEA system, make it more accessible, and reduce the number of different standards on offer while strengthening numeracy and literacy assessment. It is, however, unclear if these changes will result in the system becoming more flexible in responding to teacher desires and the rapidly changing context of climate change mitigation and adaptation pressures. The desires of the participants and myself to deterritorialise the NCEA system remain.

Findings and Implications

The participants revealed a desire to deterritorialise the institutional assemblages of the education system. In particular, they wish to work in a cross-curricular way, focus on real-world issues, and have the opportunity to "infiltrate" (Jessica, Interview #2) and cross-fertilise climate change education into their respective subject areas. The participants view the standardised NCEA assessment praxis as a critical hindrance to their desire to gain the freedom they seek to enact meaningful climate change education in Aotearoa. A deterritorialisation of assessment is seen as necessary to make room for the design and enactment of the education they seek to deliver. Because the government-prescribed assessment system dictates most of the enacted curriculum, deterritorialising assessment praxis suggests itself as the most potent action to enable much of the rest of the participant's deterritorialisation desires.

The desire for the deterritorialisation of subject silos is reflected in a growing body of literature that seeks solutions to the construction of meaningful climate change education (Howard-Jones et al., 2021; Lethonen et al., 2019; McGregor & Christie, 2021; Ojala, 2021; Santone, 2018). However, Eilam (2022) raises concerns over walking away from subject specialisations and suggests that climate

change education should become its own separate subject area instead. The author bases this view on a focus on knowledge acquisition as the purpose of education and his concerns over the loss of specialist knowledge and skills that could result from negating the diffraction of learning into disciplines. However, these views seem rooted in a traditional view of education, which is challenged precisely by the complexity of dealing with an unprecedented crisis, to which a cross-curricular approach seems the most appropriate response to develop the competencies required (Hemminki-Reijonen & Logadottir, 2021; Kiely et al., 2021; Okada & Gray, 2023).

Backcasting from the question of how to construct assessment of what really matters in the time of the climate crisis, Silova et al. (2019) argued that "we must rethink the very foundations of existing forms of education" (p. 345). Interestingly, in searching for direction, these authors argued for a "critical distance from Western modes of thinking and education" (p. 345) and hinted at indigenous ideas for education as a pathway to explore. This points to the specific opportunities found in the bicultural status of Aotearoa.

5.3 Desire to Raise Student Engagement

Challenges to enhancing student motivation and engagement have been one of the key issues facing many participants. From my own teaching experience, I can say that despite ample talk about the climate emergency in news media, getting the majority of students to engage with climate change in the classroom and climate action can be difficult. However, some students are highly engaged and have become leaders in the climate strike movement (Bright, 2023). The participants in this study commented on various strategies from their praxis to bring about greater student engagement.

5.3.1 Collectivising Agency: Aspirations and Risks

Humans are tribal, and the capacity for collective action is a product of long evolutionary development. The multiplicative power of collective agency in education is well-researched, in particular regarding engagement with the big problems of our time (e.g. Bencze & Alsop, 2014; Bolstad, 2020; Momennejad, 2021; Nairn, 2019; Ostrom, 2000; Stevenson et al., 2018). It is no surprise that the participants reported their desire to instrumentalise collectivise agency for student motivation. But they also pointed to pitfalls that can result in backlash and frustration.

Nora emphasised the power of collective action that was reflected in her PhD thesis research:

> I work in the space of hope and critical hope. And my thesis argued that young people are actually in their solutions to working together when we collectively are working together to be activists for any type of social justice, including climate justice. That hope

> is really, really, important, and that they actually can generate that hope among themselves by having these groups and allies. (Nora, Interview #1)

However, Nora pointed out that frequently, this is not what is offered at schools for the students. Instead, she found that schools often patronise students and display a "condescending attitude towards young people" (Nora, Interview #1). Often, Nora said, schools tell students contradictory messages. On the one hand, students are told that they are the ones who can change the world, and on the other, they are told that they are too young and not mature enough to do so. Students need adult intergenerational allies, Nora argued.

> My Reflection: *I concur with Nora's sentiments. At the farewell dinner for my last year 13 high school class, I told the students that we, together, the old and the young, can be radicals. I said: "You are young and have nothing yet to lose. I am almost retired and have not much left to lose. We can be radicals together". The people in the middle, bogged down by 25-year mortgages, having responsibilities for a family, and working in stressful jobs, fear change. But it is change we need if we want to conquer the Anthropocene demons.*

Paulene said that students don't argue about whether climate change is happening but that it is far more important "to give them a feeling that they can take some action" (Paulene, Interview #1). However, Paulene wondered what it actually is that students can effectively do.

Anne, with respect to student projects aiming to initiate change, stressed the importance "to point them [students] to places where they can succeed before they take on something like that" (Anne, Interview #1). Anne reported from her own experience and research that collective projects that students begin with the ambition and engagement to change the school environment often end in failure and cause deep-seated frustration. Anne said that the consequences of students failing to achieve their goals are crushing: "This idea where they tell them, 'Yes, you can'. And then when they fail, we go, 'Oh, you tried, good for you'. And they're like, no, it's actually so crushing because I actually wanted to do this" (Anne, Interview #1). Anne concluded, saying, "There are a lot of schools where students probably shouldn't be trying to change the school environmental behaviours because they're going to fail. And we need to point them to places where they can succeed before they take on something like that" (Anne, Interview #1). Anne followed school leavers into their first year of tertiary education during her PhD research. She reported that students who tried to change school culture but failed and were told, "Na! Never mind" (Anne, Interview #1) had lasting emotional consequences for their belief in the ability to bring about change.

Jessica concurred and said, “I just got to slow my students down because usually, they want to save the world in a year, you know. ‘This year, we're gonna take over big business’. I'm like, ahem, yo, yay, okay let’s start small” (Jessica, Interview #1).

Tanya had extensive experience in guiding collective student action. She developed a year 13 social anthropology course at her school covering climate change and its social implications. Tanya said that the students don’t need convincing that climate change is happening, but they are really interested in making necessary change happen. She said the students “took it as a given that the world was screwed up and needed to change. And they were interested in how to make it happen. And so that was quite refreshing actually, and quite interesting for me as a teacher” (Tanya, Interview #1). Tanya evoked a deep understanding in her students of how activism and agency evolve through a series of events and took the student strikes as an example. Tanya analysed with her students the dynamics of social movements, the triggers that started them, and the events that promoted their momentum. Tanya said, “We look at the roles that people take in social movements. We look at the particular actions that people choose to take, and with an emphasis on nonviolent civil disobedience” (Tanya, Interview #1). To promote the potential for hopeful student agency, Tanya stated that “every year, probably the single biggest learning we want them to get out of the whole course is a healthy disrespect for authority” (Tanya, Interview #1).

Tanya argued that promoting student activism in light of increasing climate disasters and humanitarian impacts arising from them is a challenging “psychological exercise as a teacher” (Tanya, Interview #1). Often, students can get very frustrated, Tanya said, and they need to “have a really strong sense of their own agency, around what they can do, and whether there is hope at all” (Tanya, Interview #1).

These testaments from the participants point to the challenges and opportunities for engaging students in collective actions. The outcome of student actions is unlikely to change the world, but witnessing and experiencing success, even in small increments, is crucial for developing agency in students. Crushing student spirits by failures in ambitious projects can possibly do more harm than good. “Idealism can fuel your dreams or crush your spirit” (Santone, 2018, p. xiii). Climate change is a global issue, and only global collective action can bring about the mitigation required. Students need to be carefully led to embark on meaningful and *achievable* projects with the intended learning outcome of *witnessing success, not failure,* as the result of personal and collective action.

5.3.2 Social Justice and Ethics as Motivators

Many participants argued that teaching the science of climate change, while important, is not a good motivator to generate student engagement. However, the participants noted that contemplating the impacts of climate change on nature and human society and contemplating matters of justice and equity motivates students and generates engagement. The experiences and desires of the participants broadly align with Santone's (2018) call for reframing the curriculum by diffracting sustainability education with social justice and ethics. Crucially, Santone brought the big questions back to the local and the here and now and asked, "What's the story we want for ourselves, our students, and our communities, near and far?" (p. 9). The answers, as Santone (2018) found in over 20 years of research with target groups, are always centred around themes of fairness, social justice, and a healthy environment. Linking the threats to social values posed by climate change to these core aspirations offers the opportunity to tap into the collective agreement over basic social goals and motivate action and engagement.

Nora has undertaken research on climate justice and worked not only as a teacher but also in the role of providing professional development to teachers. Nora contemplated the direction in which curriculum development needs to move and argued that "climate justice is huge" (Nora, Interview #1). Nora reported on a school in the USA that took students to Bangladesh to experience the situation of extreme vulnerability to future climate change in which millions of people live today and to explore matters of privilege and climate justice. Students experience that climate impacts are not just statistics but happen in real life. Nora said, "Students were much more engaged and actually really got involved in activism around climate change from a justice perspective" (Nora, Interview #1). Convinced of the importance of the justice aspect in climate change education, Nora said she organised a group of education and climate justice activists and experts to develop a framework or model for teaching about climate justice and how this can be linked to transformative learning. With respect to the Curriculum of Aotearoa, Nora emphasised the need to "utilise the inquiry process of social studies, which has social action, and empower young people to take action, and critique power structures in which you really hold people in power to account" (Nora, Interview #1).

Nora also emphasised that in Aotearoa, the aspect of climate justice is linked to the Te Tiriti o Waitangi and the rights of Māori and other indigenous people in the Pacific. She pointed to the fact that Pacific Island people are at the forefront of experiencing rising sea levels and being threatened with losing entire islands in the future. Concerning student engagement, she pointed out that students today lack first-hand experience of life in circumstances other than the high-tech consumer society into which they were born and which they normalised. This makes it hard to empathise with other

people who live in areas at much higher risk from climate change. Nora linked climate justice to the theory of critical hope in a recent research project and said she used "Paulo Freire and critical hope as my main framework" (Nora, Interview #1). She referred to UK researcher Sarah Amsler (2019; 2020) and said that she defined "hope as the possibility of possibility" (Nora, Interview #1). Nora said, "I think that's what climate education needs to be, the possibility of possibility" (Nora, Interview #1).

Tanya's engagement in climate change education is based on social justice activism. She said, "I see myself as a climate activist, but I'm more of a social justice activist than anything, and I see climate activism as part of social justice" (Tanya, Interview #1). Tanya thought that climate activism was part of her social justice stance and wanted to raise her kids with an appreciation for social justice. Tanya reported that teaching students about climate science was not a major issue as they did not need to be convinced about it but already understood it. She now focused her course on sociology, social action, and social concepts, leading students to undertake social inquiry and design social campaigns. Her class studies the "capitalist response to climate change, and what has been the impact of capitalism on climate change" (Tanya, Interview #1). Her students, Tanya reported, were struggling to remain optimistic. Her class was split between environmentalist optimism that the environmental movement will prevail and all will be fine and others that remain sceptical about the ability to avert a climate disaster and the humanitarian catastrophe it would entail.

Jacob thought that social justice is strongly linked with action on climate change. He said that while sea level rise could threaten the community, current social issues of justice and equity are much more pressing.

> When they haven't got shoes for their kids, or there isn't enough, you know, it's two days before payday, and the only food in the house is half a stale loaf of bread or something. So, you need to have this as well as an environmental lens. You need to have this social justice lens as well. Otherwise, you know, it's social, and it's got to be deeply embedded. What we're striving for isn't just a solution to environmental problems, but we're trying to get social equity on the table as well. (Toby, Interview #1)

Sarah said, "I've noticed if I tried to do a climate change topic, students shy away, you know. This concept is huge. It's a massive undertaking; it's daunting. Big words have been thrown at them. And the science behind it is quite straightforward" (Sarah, Interview #1). However, Sarah said that student engagement rises when she talks about the future impacts of climate change on nature, social justice, and the ethics of protecting what people love in the environment. Clearly, students engage when they consider matters of impact on the living and social world around them and the impacts of pathways

into the future. She connects this with students' personal interests in social and local issues. Talking again about her emphasis on nature connectedness and on generating empathy and contemplating justice in a broader sense, Sarah said, "We need high school students to experience the outdoors and to just sit and be with nature to really care to gain that empathy" (Sarah, Interview #1).

5.3.3 Design and Recycling as Motivator

Tackling climate change in meaningful ways within a school environment while providing hands-on engagement is not an easy task. Several participants reflected on engaging students with activities involving the awareness of the flow of materials through society and recycling.

Brent, teaching design and technology, focused on conscious and environmentally friendly design with a focus on recycling, reuse, and upcycling of materials as part of climate justice. He promoted "cradle to cradle" (Brent, Interview #1) thinking in order for students to understand that all materials have a life cycle. Brent said understanding the flow of materials in society deeply will give students "a lot of agency" (Brent, Interview #1). Brent exemplified the flow of materials with his students on the example of a cheap pencil to generate awareness of the complexity of consumer society:

> If you take a simple pencil and you were to get a student to think about every single resource that went into it, every single person, and every single resource that went into that person, you realise that a simple pencil is worth more than 30 cents that you spend on it, and it ends up being a million-dollar project and you as a student looking into that, that's an overwhelming thing. (Brent, Interview #1)

Brent said that as a technology teacher, he believes he can teach students to design using reused materials and that knowing and contemplating the flow of materials in society is an important motivator for doing so. Brent thought of engaging his students with a rubbish collection project, whereby they would collect every single piece of rubbish they generated in a week and then bring it in to compare what people had accumulated. He said he barely filled half a plastic bag when he did it himself but expects some students to bring in three bags.

Brent talked about experiences living with nomads in Mongolia and their incredible ability to use every resource they have thoughtfully and with consideration for the ecosystem into which they dispose of something. He pointed to his experience in many developing countries and hoped to translate some of the mindfulness he perceives in these cultures into the Western world in which he teaches. Justice with regards to the behaviour of society towards resources and environmental consciousness must come for Brent from leadership. Contemplating responsibility for product design, he engaged his students in thinking deeply about consequences:

> At what point do you say that's the individual? And what point do you say, that's the company? But at what point, as a technology teacher, do I say you should be designing for the user, you should be designing for the climate, or you should be designing for the company? And what I mean by that is, should I be designing products that disintegrate as they get thrown away? But in so doing, I'm allowing things to be thrown away? Or do I have products that don't require so much packaging? And where does that leave the consumer experience? Because then I'm disregarding the company? Or do I design a package that can be reused? (Brent, Interview #1)

For Brent and his students, climate change education is embodied in the ethics and social consequences of design. Brent was mindful that he wouldn't win all battles and even thought there was merit in purposefully losing some. "And it may just be the idea of the same thing that you get told as a teacher: you pick and choose the battles. And it may be the ones that you pick, you purposely lose, but you purposely lose them for a cause" (Brent, Interview #1). He pointed out as an example the possibility of a failed engineering project at school generating a heap of useless scrap metal. The students then could experience this and hold it as "a piece of awareness for that student and even if it's one for the rest of their life" (Brent, Interview #1).

5.3.4 Gardening and Composting

Several participants pointed to gardening and composting activities for engaging students with the material cycles involved in food growing as a pathway to hands-on sustainability engagement. The benefits of school gardens and school-based food growing for sustainability education are well-researched (e.g. Alexander & Grannum, 2022; Corkery, 2004; Silva & Assis, 2021; Williams & Brown, 2013). School garden development was an example cited in the discussion of the WEARS projects [Wicked problem, Experiences, Available Resources, Solution-Innovation] for sustainability education by Jensen et al. (2019), and the authors' discourse could provide valuable inspiration to teachers looking for theoretical underpinnings for their planning.

Ella reported on her success in raising student engagement in her extra-curricular gardening group. She discovered a shed full of old tools at her school, a fenced-off, disused old horticulture site and started a gardening club. Ella said she "started trying to get kids to think about food growing and sustainability in my junior classes" (Ella, Interview #1). Ella started the gardening project by first developing healthy soil with the students. She said she started with dead soil but began to regenerate the site with her students through composting. She said this activity had been really awesome for the students. Ella said some students "never planted a seed and had never grown anything. And what really blows their mind is when we have a harvest day. And they'll be like, okay, we're gonna pull out

all the carrots now. And then you can take them home, and they're like, 'what they're free?'" (Ella, Interview #1). Ella was "over the moon" (Ella, Interview #1) when a Māori student who was very engaged in the gardening club, saved up her pocket money to buy seeds and planted a small garden at home during the first national Covid-19 lockdown. "This is exactly what I was hoping to see" (Ella, Interview #1).

Sarah also engaged students with sustainable food growing and composting activities. She said, "We've started an environmental group within the school, and they work on the bins to make sure there's composting at the school." (Sarah, Interview #1).

Moana engaged students in generating a food garden, a māra kai, at her school. Her school has lunches delivered for all staff and students. Starting with a composting activity for all food scraps from these lunches, Moana organised composting bins and used the compost to build up the soil for her māra kai, which she said will be fully operational as a food-growing garden for students to harvest food in the next year. Moana argued that this is an important part of grounding students and preparing them for kaitiakitanga, a Māori sense of guardianship. Moana believed this could be "quite a game changer for our community and our country, really. Because if we can get learners to say, 'hey, we can do this at home, it's accessible, it doesn't cost us anything, and we are making a difference', that's pretty powerful" (Moana, Interview #1). Moana and her colleagues installed planter boxes for the students in the schoolyard, where the school's students from different houses (whanau) grow food and traditional medicinal plants.

Rawiri had similar ambitions as Moana and said he would like to introduce composting at his school, which he said was so far completely absent. He was inspired by his partner's experience, who taught at a rural Māori immersion school, where the school leadership got together to minimise students' lunch waste by making reusable beeswax lunch wrappers and composting food scraps to fertilise gardens. Rawiri hoped that his school would implement similar measures and believed that connecting students through composting, worm farms and productive gardens to the food cycle would be excellent role modelling for sustainability thinking.

Findings and Implications

The participants used diverse strategies to increase student engagement. Tanya mentioned her strategy of instilling healthy disrespect for authority as being generative of hope through leveraging a burst in perceived personal empowerment that comes from such a position. Participants recognised that the collectivisation of agency is a key strategy for the promotion of wellbeing and the generation of hope (Bright & Eames, 2022; Nairn, 2019). Strategies for the co-production of knowledge were

visible in the participants' narratives, which corresponds to strategies emphasised by Rousell and Cutter-Mackenzie-Knowles (2022) as a way to become "aberrant" (p. 136) and explore the space of possibilities for possible futures that are different from the climate killing present. However, as some of the participants found, collective co-constructed student projects aiming for meaningful outcomes are frequently frustrated within the time and resource-constrained reality of the school environment. The experience of project failures can cause significant harm to student self-esteem, as Anne (Interview #1) argued based on her experience and her own research.

Many participants said that appeals to social justice and ethics are effective strategies for raising student engagement. This conforms with literature that makes strong links between social justice and climate change education (e.g. Santone, 2018). Recycling and gardening projects were often mentioned as go-to contexts for practical student work by several of the participants in order to connect hands-on activities with the climate change problem, reconstitute the ecological self in the Anthropocene (Moser, 2019) and reduce the disconnects from nature in urbanised society.

5.4 Desire for Reterritorialisations with Nature

A growing body of research points to the importance of nature connectedness for the promotion of environmental awareness, student wellbeing and the development of emotional and rational understanding of the climate change problem (e.g. Duke & Holt, 2022; Liefländer et al., 2013; L. Martin et al., 2020; Pirchio et al., 2021; Pritchard et al., 2020; Restall & Conrad, 2015). Chawla (2020) reviewed the literature *of research on connecting with nature and coping with environmental loss* and concluded that nature connectedness fosters the generation of hope and taking action to protect nature. Bringing climate change into discourse with respect to experiences in the student's local environment has been found to be especially productive (Duke & Holt, 2022). The connection to tangible local experiences is vital to bringing what often is a discussion of global issues and predictions that seem removed from direct experiences geographically and in time back into direct and relevant contact with students. Climate change discourse, as Duke and Holt (2022) argued, frequently generates spatial, temporal, social, and hypothetical "psychological distance" (p. 2). In the context of the framework used in this thesis, climate change is frequently conceptually deterritorialised to contexts outside of the personal assemblage. Climate change is perceived as a phenomenon that affects other people in faraway places and, hypothetically, disjunct from personal day-to-day actions in the future. Duke and Holt (2022) pointed to research showing that personal relevance of local nature-based contexts help to lower this distance. While this can enhance awareness and readiness for climate action, the authors also argued that bringing climate change close to the personal sphere of here and now can increase fear, which conversely can trigger a retraction from the climate change thematic, as an emotional

protection mechanism. However, it is clear, that humanity needs to radically change human behaviour toward the environment to address the climate emergency and the existential ecological crises. Pirchio et al. (2021) pointed to the importance of outdoor education and nature connectedness to promote the development of pro-environmental attitudes society needs to amplify.

For several of my participants, nature connectedness not only featured as an educational strategy but also served as a personal refuge and re-energising home base, a place where they can become reterritorialised and to which they believe students should be connected through their teaching in pursuit of effective climate change and sustainability education. Often, notions of nature connectedness overlapped with connections to indigenous Māori cultural heritage and philosophy. Reterritorialisation with nature is one of the lines of flight drawn by the participants' narratives toward a sustainable future and part of the activism they desire to grow.

5.4.1 Sarah's Ideal Education Assemblage

Sarah developed a particular emphatic stance towards nature-based teaching, and her views are presented and discussed in some detail to exemplify the desire for a return to nature and nature connectedness that several participants reflected upon. Sarah took part in the assemblage drawing activity (see section 3.3.8), and the dialogue I had with her over her drawing is featured in this section. Sarah thought about how her particular affinity to nature-based teaching and learning started and looked back at her upbringing. She said, "I think I was lucky. During my high school experience, I did an award called the Duke of Edinburgh[26]. Yeah, and through the hikes and learning how to plan for those hikes and being outdoors for up to five days, gave me the chance to respect nature on a different level" (Sarah, Interview #1). Sarah said she hoped to replicate this experience in a classroom setting.

Sarah quit her job at a recently built suburban high school, where place-based education and modern learning environments created a progressive and innovative education culture. However, this environment seemed still too far removed from Sarah's educational ideals. Sarah turned literally nomadic and started to walk the length of the country on the Te Araroa trail, a 3000 km walking trail from Aotearoa's North Cape to Bluff in the far south, in search of her ideal 'bush school' setting. Her idealistic vision is presented in some detail as a case of a genuinely transformative vision and desire.

[26] The Duke of Edinburgh's International Award (https://dofehillary.org.nz/) is a global and non-formal education framework and challenge to young people to engage with different sections of skill and leadership development, voluntary service to the community, and adventures in nature. In Aotearoa it is also called the Hillary Award after the New Zealander Sir Edmund Hillary, who was the first to ascend Mount Everest with Sherpa Tensing Norgay in 1953.

Sarah said, “As far as hopes in my education career, it's the power of learning and being fully immersed in nature that I want to pursue” (Sarah, Interview #1).

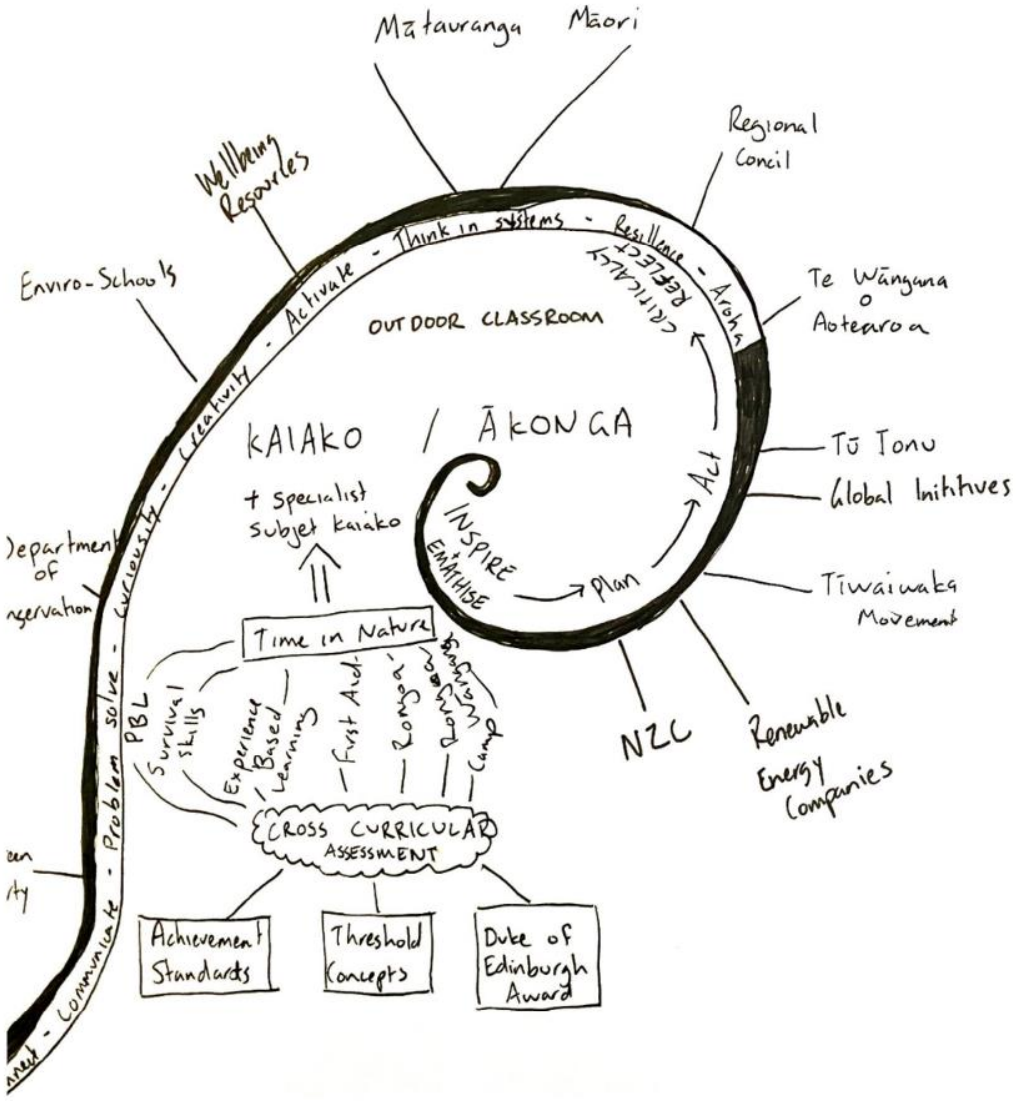
In her previous teaching position, Sarah used nature connectedness as an emotional motivator in her science teaching. She engaged students in the study of Kauri dieback disease, caused by an invasive fungal tree infection that is threatening the remaining majestic Kauri trees in Aotearoa. Talking about the Kauri trees grieving, Sarah said, was “mind-boggling” (Sarah, Interview #1) for her science class of 16-year-olds. Sarah said, “We talked about personal, interpersonal, and societal factors of the Kauri tree itself, and then went and hiked the Pinnacles trail to see the Kauri in their habitat. And noticing, you know, the history of logging in the ways that it was milled up through the Kauaeranga Valley. And that led to, I guess, a more memorable learning experience” (Sarah, Interview #1).

Sarah developed the belief that learning and assessment and the NCEA qualifications should be nature-based. She said, “The best and most memorable experiences are in the outdoors. So, to take the comfort and nature being the everyday, that's your learning kind of base and putting it into a bundle or a way to achieve, you know, your NCEA qualifications. You're gaining through high school the connection to the land which is needed to alter the mindset and the climate emergency” (Sarah, Interview #1). Sarah said, “As far as hopes for my education career, the power of learning and being fully immersed in nature is something that I want to pursue”. Sarah dreams of working in a “bush school”, a fully nature-immersed learning environment, where she can “create a curriculum which intertwines nature throughout all their learning” (Sarah, Interview #1).

In a second, long interview with Sarah, after she had covered over half the country on foot, she explained a developed vision of her bush school ideal in the form of an assemblage drawing (Figure 5-5). Sarah said her vision starts in the centre of the unfolding Koru (Aotearoa fern bush frond) with herself, the Kaiako (Teacher), and then goes on to the Ākonga (Students) and progresses from the inspiration of teachers gained from nature to the planning of a course and unfolds like a ponga frond (Aotearoa fern tree) into action and critical reflection.

Figure 5-5

Sarah's Assemblage of an Ideal Education



Dreaming about her idea of an outdoor school, Sarah said:

> It's in the shape of a koru, showing that kind of never-ending journey, with the idea that it's constantly moving and blossoming, and it's got so much support and external elements as well as holding close to it. It's a kind of internal capacity as well. So, if you could see, kind of coming up the thin line of the koru pattern, you can see: Connect, communicate, problem solve, curiosity, creativity, activate thinking and systems, resilience, and aroha [love]. I think that underlines the key competencies of the ideal kind of school with climate at the front. And especially problem-solving, and that creativity element for students to be the precursors of thinking outside the box and not

> being scared of mistakes or failure. And those, kind of, are like the values and the competencies that we always go back to within a nature school. (Sarah, Interview #2)

Sarah emphasised that teachers need to generate opportunities instead of creating boundaries. She explained the outside of the circle as the external resources her idealistic school would link to, with an emphasis on indigenous wisdom. She said, "I think kaumatua and respected people of the iwi or the community that we are in, should be our most sought-upon resource when it comes to the Earth and Papatūānuku[27] and the climate" (Sarah, Interview #2). Sarah saw specialist teachers joining her school for certain subjects, depending on their students' learning interests and the projects they took on. But Sarah emphasised that her school is all outdoors and connected to nature. "And once we can think in our, in our native environment, and be part of nature, we are way more inclined to care for it and understand that" (Sarah, Interview #2).

5.4.2 From Roots in Nature to Nature-Connected Teaching

Several other participants also highlighted their personal roots in the form of a nature-connected upbringing or personal experiences in nature as motivating factors for their engagement in climate change education. Participants reported using nature connectedness as an explicit strategy for raising empathy with nature, teaching the implications of climate change, and shifting cultural attitudes for the next generation.

Claire reported on her grounding in nature connectedness through her upbringing. She said that her interest in becoming active as a climate change educator came from a deep emotional connection to nature. Claire was introduced by her father, an active mountaineer, to appreciating nature. "[W]e spent a lot of time just in the wild, wonderful, remote places" (Claire, Interview #1). Claire said she is aware of the transformations of nature through human actions. She said that Aotearoa "has some really pure and remote places, but they're becoming fewer and fewer now" (Claire, Interview #1). She commented on the impacts of industrial-scale farming with "ridiculous levels of irrigation and dried up riverbeds everywhere" (Claire, Interview #1). Claire taught English, and in this subject, she felt that she had no obvious reason to take students outdoors. However, she wished that her school would embark on more cross-curricular learning and pointed to the fact that the outdoor education faculty was now taking students not only on outdoor adventures but engaged with tree planting and other activities that directly provided students with hands-on activities that enhanced their emotional connection to nature.

[27] Māori mythology Papatūānuku is the word for Earth or Earth Mother. Papatūānuku is the wife of Rangi-Nui, the sky, and all living things originate from their marriage (Simmonds, 2009).

Jessica reported growing up in a family with strong nature connections. “Dad was really into tramping the outdoors. We did a lot of camping. We went sailing. We did lots of walking, and he propagated plants. And so, we sort of grew up in the outdoors. And I guess my love for the environment, sort of, I guess, comes from that” (Jessica, Interview #1). Jessica said that when she started her teaching career, she was looking for extra-curricular engagement with her students and settled on the environment. She created an environmental group that made an outside garden with a worm farm and painted “some beautifying murals around the school of nature” (Jessica, Interview #1). When possible, Jessica tried to take students on field trips to the bush or rivers. She said many students, even though they live not far from nature, never went into nature with their families. Jessica said, “Getting out into nature is, I think, really important. I think it's really important for your personal self, but it's also part of your wider community” (Jessica, Interview #1). She added that she likes to take students to places where she said, “Nature is in control as opposed to our environment” (Jessica, Interview #1).

Freda highlighted that her love for nature has been important in kindling her interest in promoting climate change education. “I'm really passionate about the environment, and I love just being in nature. And I've always been into the conservation of native species and looking after our native environment and things like that. I even bought a piece of West Coast bush just because I think it's so beautiful. And I love bird watching and things like that” (Freda, Interview #1).

Moana connected her students emotionally and actively with the environment and referred to indigenous philosophy. She said, “Probably one of the first stories that I teach about is around the whakataukī (Māori proverb) ‘Ko au te whenua, te whenua ko au’, I am the land, and the land is me. So, when we think about our waterways and how unhealthy they are, that's a reflection of us as people, we're also unhealthy. Our connection to whenua goes right back to our creation story” (Moana, Interview #1).

> My reflection: *I reflect on two years sailing the Pacific Ocean as instrumental in deepening my connection with nature. Sitting on deck at night, 1000 nautical miles from anywhere, the mast tracing figure eights across the stars and streaks of luminescence in the water made by fish travelling at speed, the sense of universal connectedness is overwhelming. Reconnecting with the memories of these days in the consciousness of the anthropogenic destruction of nature is generating activist energies but also a deep sense of grief in light of weighing the probabilities of the struggle of saving the planet ending well against the odds that it may not.*

Findings and Implications

Most participants commented on the importance of nature-connectedness for their lives and spoke of the desire to instrumentalise it in their teaching. Nature connectedness is a well-regarded and researched (Restall & Conrad, 2015) avenue to raise environmental awareness, foster spiritual growth, and generate empathy with the more-than-human world as a foundation to trigger ecological behaviour (Otto & Pensini, 2017) from which to build meaningful climate change education (Duke & Holt, 2022). Several participants commented on how connectedness to nature has been instrumental in their upbringing and motivated them to become climate activist teachers.

The potential of non-theistic spiritual transformation of teachers and their students through outdoor education programs was the subject of research by Hollingsworth (2022). The author engaged with Deleuzian concepts in his thesis and argued that non-theistic spiritual transformation in outdoor education progresses in a non-linear manner through "purposeful, numerous, and recurring" (p. ii) events and encounters. Such events in and with nature, as Hollingsworth (2022) argued, can constitute dissonance and trigger threshold experiences through which students and teachers deterritorialise from one state of mind and reterritorialise in another, with potentially life-changing implications for their spiritual connection to life.

The insights on threshold events discussed by Hollingsworth (2022) respond to the desires of the participants in engaging students in nature-based activities, even if these are not of significant duration or involve a permanent nature-based setting such as Sarah desired, but are designed to be generative of threshold experiences or at least provide repetitive "little leaps" (p. 189) that shift perspectives in a way that becomes explicit and accessible to the student and teacher. Strategies to embed nature connectedness into teaching practice and school culture can form an integral part of moving education toward meaningful engagement with climate change education.

5.5 Engagement with Mātauranga Māori: Nomadism in Praxis

The mandated inclusion of mātauranga Māori through the curriculum refresh (Hughson, 2022) and NCEA assessment reforms (Karaka-Clarke et al., 2022; Stewart, 2022b; Tuhiwai Smith et al., 2016) instigated by the Labour Party-led government is leading teachers to question traditional teaching praxis and engage in intercultural discourse. This development was initiated in 2019 by the Ministry of Education through a process of consultation with stakeholders with the aim to "Integrate te ao Māori and mātauranga Māori into the outcome statements as part of the new 'graduate profile' for NCEA and in the design of achievement standards" (MoE, 2019, p. 7). For the participants, the aims and objectives of the integration of mātauranga Māori into teaching and assessment would already

have been part of their discussions in their professional capacity during this research. Several participants mentioned connections between climate change education and mātauranga Māori and reflected on the opportunities and challenges it might bring to their praxis.

Moana taught in a bicultural setting in her school and enjoyed the transdisciplinary learning and the integration of sustainability achievement standards with mātauranga Māori and emphasised that "relationships are key for staff and learners in order to make it work" (Moana, Interview #1). She said:

> I feel very grateful to be where I am and to be able to deliver, firstly, our mātauranga Māori around climate change. I think that's really important for our urban Māori to re-establish that connection. A lot of them never had that connection before to the whenua. So, I feel very fortunate to be firstly in this space and be able to teach that. And there's a sense of relief as well, you know, to see that they've made that connection, and now they've got to take that action home to their whanau as well. (Moana, Interview #1)

Rawiri felt fortunate that he is teaching from a perspective of indigenous culture and the inclusion of mātauranga Māori into the curriculum. He said:

> The last two or three years, I think with some of my seniors, we've been exploring concepts of Manākitanga, you know, nurturing and caring for all things, environment, and all people. And there have been some really interesting topics that have come up with our students. I think, three or four years ago, when I first started kind of exploring this context, it was not long after the Rena[28], the containership, that went aground in Tauranga. And one of my students researched it and actually wrote a beautiful essay about, you know, how this has affected the environment, how it's affected the people. So yeah, I think you're right. I feel very fortunate, and my subject, being language-based and Tikanga-based, being history-based. (Rawiri, Interview #1).

Ella acknowledged the recently proposed changes about the inclusion of mātauranga Māori into the school curriculum and wished that a similar effort would be made to include climate change across the curriculum. Ella said:

> So, we've just had this big change and the New Zealand curriculum that has, really, you probably read all about it, it brought in mātauranga Māori, which is a really big part of

[28] The freight ship Rena ran aground in front of Tauranga Harbour on the 5th of October, 2011, causing the pollution of local beaches, reefs, and fisheries with oil and thousands of items from the ships freight (Schiel et al., 2016).

> the curriculum to try and, you know, put it on equal footing with Western bodies of knowledge. And pretty much every programme that we read in every unit and every assessment should sort of have some kind of element of mātauranga Māori, like all of the art [NCEA] standards now have to have something to do with Māori art, and which is awesome. But I think the same thing needs to happen with climate change. Everything that we do at school should be like not, not even just neutral, like it should be benefiting the environment somehow. (Ella, Interview #2)

Nora said she looks forward to the deeper engagement with mātauranga Māori and hopes that Western knowledge systems would begin to look to mātauranga Māori for solutions. She said:

> I guess the biggest shift that would come, and what would be the most transformative, is for that to influence the way that Western bodies and knowledge systems, and everything, and solutions, are looking to mātauranga Māori for those solutions. And I feel like it's starting to happen. (Nora, Final Interview)

Freda looked to mātauranga Māori as a way to teach the nature of science and to engage students with the Māori worldview on the connectedness of all things. Freda gave the example of the Māori concept of the "mauri [life force] of the river" (Freda, Final Interview) for teaching students about river pollution in Canterbury, the region where she teaches.

Sahra, whose assemblage drawing was discussed in the previous section, said she put mātauranga Māori at the top of her drawing, giving it an anchoring position for the evolution of her nature-based teaching ideal. She also said, "I think kaumatua [respected Māori elders] and respected people of the iwi or the community that we are in should be our most sought-upon resource when it comes to the Earth and Papatuanuku and the climate" (Sahra, Interview #2).

Jessica pointed to some challenges of bicultural engagement in the administration of consultations and engagements with Māori organisations and the risk of tokenism arising in this process. She commented on the fact that her region only has a low proportion of Māori residents, which troubles the ability to engage effectively in intercultural dialogue, which also affects education. Jessica said:

> South Canterbury has a relatively, I guess, proportionally low Māori population. And we always go to one Marae for their opinion. And my husband works in a government department, and they also go to that local Marae for all their [consultations]. You know, we need someone from the Marae on the board, we need someone at this meeting, we need someone at that meeting. And I just, I sometimes feel that we've got to be really cautious that we're not just burning them out. But also, you know, those one or two

> representatives are the voice of their people? I find this quite, I guess, racist in a way. And it's about respecting that but also challenging that a little. (Jessica, Interview #2)

Jessica's comment points to an impediment to the growing interest in making cross-cultural engagement with mātauranga Māori authentic within education. The demands for engagement with Māoridom, that was generated by the recent emphasis on indigenous culture within the education system, put pressure on scarce resources and a yet-to-be-fully evolved body of research on mātauranga Māori by Māori, as Māori researcher and educational leader Te Ahukaramū Charles Royal (2020) stated in a recent conversation with me.

The discourse with indigenous knowledge in the context of climate change is an area of significant inspiration and hope (e.g. Carter, 2019b; Lazrus et al., 2022; Munshi et al., 2022; Royal, 2008; Skipper, 2020; Thornton et al., 2019). I argue that for Pākehā teachers, the engagement with mātauranga Māori can become part of a deterritorialisation process that leads out of the settler-colonial identity assemblage that still holds many Pākehā captive and toward becoming culturally nomadic as risk takers and explorers, the educational nomadic tribes that Semetsky (2009) envisioned. Nomadism and the opportunity of otherness, as Braidotti (2013) argued, "prompts, mobilises and allows for flows of affirmation of values and forces which are not yet sustained by the current social and historical conditions" (p. 343). This mobilisation, as I argue, when generated within the context of cross-cultural traversal through engagement with mātauranga Māori, corresponds to the mobilisation required to seek pathways out of the climate-changing habits of being. Becoming deterritorialised and nomadic is a process of self-reinvention and giving in "to desire the self as a process of qualitative transformation" (Braidotti, 2013, p. 344).

This cultural deterritorialisation process is by no means well developed yet in Aotearoa. While the mandate to incorporate mātauranga Māori into the curriculum is demanding engagement from all teachers with this topic, only some of my participants referred directly to personal engagements with mātauranga Māori. For some, like Moana and Rawiri, this was obvious as they have grown up embedded in Māori worldviews. Colonialism expelled Māori from their cultural and physical territory and made many of them involuntary nomads within their ancestral territory. The cross-cultural encounter between Western Cartesian educational assemblages and indigenous cultures may be seen as a step towards nomadic thinking for Pākehā. But for Māori, the tables are turned. For Māori, the process of reinvigoration of cultural and ancestral identity is a process of reterritorialisation, a coming home to indigenous foundations, assemblages and reclaimed territories within the westernised society of Aotearoa, where the exploration of nomadic ideas and the questioning and gradual relinquishment of territorial boundaries has become possible, but by no means universally acceptable

(Cuthers, 2018; Peterson, 2001; Vague, 2022). Furthermore, as Whyte (2018) and Rousell and Cutter-Mackenzie-Knowles (2022) argued, for indigenous people, the threat of climate change can be seen as a continuation of a present-day dystopia that originated in the time of colonisation and never ended. From this perspective, and living already in a post-apocalyptic time, climate change morphs into a present-day challenge and no longer presents itself as a dystopian future dread.

Giving justice to the unpacking of the complexities, challenges, and opportunities of cross-cultural engagement as a line of flight out of climate-changing cultural territorialisation would exceed the brief of this thesis by a significant margin and be worthy of its own extensive body of work, in particular, in the context of Aotearoa.

> My reflections: *reflecting on the concept of nomadism and the opportunities of multi-cultural discourse in the space of climate change and my past time as a science teacher, I argue that indigenous worldviews as part of the science curriculum are not meant to refine or replace the analytic capacity of Western science. However, and this is the flip side of MacLure's (2017) insight that "discourse does not discipline matter" (p. 7), I argue that discourse and the world of representations in our mind about the nature of the more-than-human world, our ontology and epistemology, discipline the mind and society. I argue that this aspect of 'disciplining society' is one of the opportunities that the inclusion of indigenous wisdom into the science curriculum, and hopefully soon into other strands of the curriculum, provides. I do not refer to 'discipline' here as an authoritarian concept vetted out by some government agency but as a positive attribute of the self and, ultimately, of society, that leads to becoming considerate and 'disciplined' with respect to desires, actions, and their consequences. I argue that such self-discipline is an essential element of preventing society from exterminating itself through its actions. This view finds support by Māori researcher Stewart (2022a), who argued against equating mātauranga Māori with science itself but to view it as a form of philosophy of science that informs science on the level of values, "below the level of the empirical knowledge base, without needing to claim that mātauranga Māori is the same as science or uses scientific methods" (p. 18).*

Findings and Implications

Due to the limited number of indigenous participants, engagement with indigenous perspectives was not central to this research. However, several of the non-Māori participants commented on the curriculum changes that bring mātauranga Māori into the classroom. A growing body of literature argues that the turn to indigenous cultural heritage and cross-cultural dialogue can become an

important part of the solution for tackling the Anthropocene overshoot and the colonisation of the planet with Western capitalist extractive and exploitative habits. The inclusion of mātauranga Māori into the curriculum was seen as positive by the participants. It might provide an example for the possible inclusion of climate change education into the curriculum through a similar curriculum reform process. The bicultural aspirations of Aotearoa in education and society as a whole offer productive pathways for engagement with indigenous worldviews and critical decolonial discourse. This is important to society's coming to terms with the causes and impacts of Western capitalist culture on our planetary trajectories. The notion brought forward by Whyte (2018) and discussed by Rousell and Cutter-Mackenzie-Knowles (2022) that indigenous people are already living in a post-apocalyptic state from which the climate change emergency morphs from a vision of future-doom into a continuation of present-day struggle gives an interesting perspective to the possibilities and perhaps allure arising from engagement with indigenous philosophies. What if this engagement could help to melt visions of future climate doom into practical 'post-apocalyptic' engagement in the present and thereby help to alleviate some of the anxieties and locked-up energies?

5.6 Summary

The participants' narratives revealed the complex challenges the climate change emergency constitutes for teachers' assemblages of themselves and the generation of desires to be agents within the education system, working for a climate-safe future. The deterritorialising impact of the existential threat from climate change to collective futures that Colebrook (2020a) identified has wide-reaching consequences for the assemblages of people, institutions, and society at large and for teachers tasked with introducing the world to the next generation, in particular. Climate change is anthropogenic, and therefore, this deterritorialisation of collective futures is a direct consequence of human agencies and the world views that inform them. Our survival, as Colebrook (2020a) argued, now hinges on our ability to "destroy that which threatens our being" (p. 347). Reflecting on the self, this is a battle that is now, consciously or not, internal to all assemblages, including the self, with particular implications for teachers.

Analysing the climate change-affected self-images, the desires and strategies of the participants fall into two categories: evoking institutional change to enable the climate education they envisage and engaging students with the learning they deem essential for them (see Figure 5-6). These desires arise from a confluence of the perceived milieu (Chapter 4) and the motivations derived from their self-image as respondents to the global climate emergency.

Teachers' ultimate desire is to enable student engagement and learning. The desired institutional change is a means to this end. Institutional change is also desired by the teachers to ease pressures on themselves, remove cognitive dissonance, reduce hypocrisy, and generate a supportive, collegial network.

Among the student engagement strategies, appeals to collective agency, social justice and ethics stood out as key motivators. This desire is well supported by the literature (Bolstad & Overbye, 2022; Santone, 2018; Stapleton, 2019; White et al., 2021).

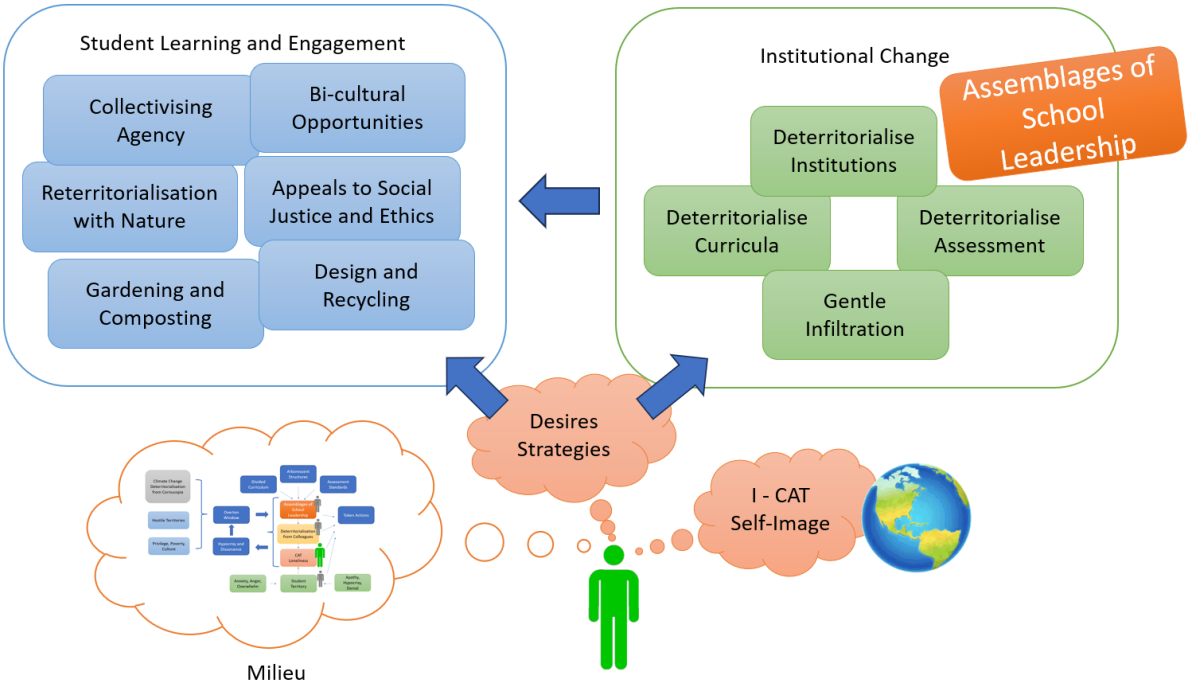
Many participants mentioned reterritorialisation with nature as a way to raise empathy and emotional connectedness with nature. Due to the non-linear impact of nature experiences through threshold events (Hollingsworth, 2022), nature connectedness as a strategy does not need to imply nature-based education, which would be unrealistic for most students. It is also a means to connect students with place-based climate change education, where students can experience climate change with their own senses in nature (Duke & Holt, 2022). Gardening, composting, design, and recycling were mentioned as practical learning activities linked to climate change mitigation and adaptation.

While the teaching of 'climate science' was mentioned, this was not foregrounded, mainly because teaching the fundamental science connections that explain climate change is taken as a given. The participants understood that the social aspects of climate change and climate adaptation are central to climate change education. When summarising and analysing the desires of the participants within the context of what could realistically enable them to enact these desires, and when contextualising this analysis with the experience the participants reported with regard to the reaction of school leadership during the school climate strikes of 2019, I argue, as I have also done in Everth and Bright (2022), that the assemblages of school leadership have a critical and enabling role to play (see Figure 5-6). See also the experiences teachers reported with school management in the context of the climate strikes (Chapter 4.11).

The national education agencies, the Ministry of Education (MOE) and the New Zealand Qualifications Authority (NZQA) are advancing slowly and conservatively on long-term review cycles of a decade and often more. These review cycles are too slow to satisfy the desires of climate activist teachers for change, and it is doubtful that the outcome of these reviews will achieve the necessary transformative momentum the participants desired. Therefore, the critical enabling agency for the desired change is vested in school leadership and their capacity to direct and encourage the institutional changes the teachers wish to see.

Figure 5-6 - School Leadership as the Key Enabler

School Leadership as the Key Enabler



School boards and school leaders in Aotearoa have a considerable amount of discretion in managing the enactment of the curriculum in their schools. It is within their scope of administrative freedom to direct the enactment of many of the desires the participants expressed, such as the deterritorialisation of institutional assemblages, the enactment of cross-curricular learning, and a school-wide focus on climate change and environmental education. In fact, as we demonstrated in Everth and Bright (2022), school leadership that we labelled in our analysis as 'conservative' sent climate activist teachers as well as climate student leaders on lines of flight away from their schools, while school leadership that we labelled 'progressive' allowed teachers and students to explore climate change activism in support of teacher's and student's desires. Bringing it back to the concept of nomadism, what I suggest here is that the assemblages of school leaderships embrace a nomadic stance and work toward active deterritorialisation of the institutional assemblages of their schools as a means of enabling the climate change education the participants desired.

6 CLOSING INTERVIEWS

The final engagement with my participants constituted a semi-structured Zoom interview to review the year's engagement with the research, the progression of the climate crisis and developing engagement for climate action. The research was conducted during the year 2021, a time when the attention of society was focused on the Covid-19 pandemic and the socio-political implications of managing this crisis. It was intriguing to probe the participants' perceptions relating to the pandemic response with respect to lessons learned for climate crisis management and education.

These interviews raised several broad, open-ended questions. The findings from three of these questions are presented here:

1. Do you think that the overall climate policy in Aotearoa is moving in the right direction?
2. Do you think the education policy in Aotearoa is moving in the right direction regarding climate change?
3. Do you think lessons learned from the Covid-19 epidemic can inform action on climate change?

Below, a summary of participants' answers is provided.

6.1 Is the Climate Change Policy of the Country on Track?

Several political and policy developments progressed in Aotearoa during the research period, which triggered me to ask this question. The Climate Change Commission released several key advice documents to the government (Climate Change Commission, n.d.), which provided the evidence on which the first Emissions Reductions Plan (MfE, 2022b) of the government was based. The Science Media Centre (2022) compiled expert reactions to the plan. While the experts agreed that the plan was a step in the right direction, they also critiqued it for falling short of the more radical advice given by the Climate Change Commission, such as the ban on the import of petrol and diesel vehicles by 2025. How the public perceives the government's climate change policy moves has a significant bearing on the public's mood about the progress made or seen to be made.

Below are the participants' answers to the question: Do you think that the overall climate policy in Aotearoa is moving in the right direction?

Anne said, "I think climate change philosophy in this country, whether it's policy within schools and councils, is very reactive" (Anne, Interview #3), and she maintained that media coverage has been very poor too, lacking a national campaign to educate people. She thought this might partially be so

because Aotearoa had not been particularly badly affected by evident impacts of climate change at that time.

> My reflection*: However, this year (2023), Aotearoa was hit by a Cyclone, followed by repeated 'atmospheric river' events with excessive rainfall, causing severe flooding and landslips in areas on the East coast of the North Island. These events have been amplified by climate change-induced ocean heat waves in the Pacific Ocean around the country and will have undone some of Anne's concerns over a lack of painful climate change impacts so far that deceives parts of the public into adopting an agnostic or even antagonistic position toward climate change policy development.*

Moana pointed to the opportunities arising due to the growing relationship of the population with 'Te Ao Māori', the Māori view of the relationship of people with the environment, and she pointed to the role of Māori TV in strengthening the country's environmental focus. Moana said, "I think one of the more fortunate reasons that perhaps we're in a position to take greater action, both sort of flow locally and nationally, is the relationship we have with Te Ao. And obviously, TV Māori as well has a huge part to play" (Moana, Interview #3). Māori TV is a state-funded, bilingual TV channel with content presented partially in Te Reo (Māori language). The station was launched in 2008 with connected websites and live streaming of special events. The station frequently airs programs that contextualise environmental and sustainability topics within the framework of indigenous knowledge and cultural connections to the environment. Moana also pointed to the obligations under Te Tiriti O Waitangi with respect to empowering the indigenous voice and creating a vehicle for greater environmental protection of Aotearoa.

Moana's narrative needs to be seen with respect to the current political context. The resurgence of indigenous Māori confidence and growing influence triggered a neo-colonial, regressive, and outright racist reaction among right-wing political forces in the lead-up to the 2023 national election. The right-wing ACT party campaigned on a platform that aims to redefine the principles of Te Tiriti O Waitangi through a public referendum that would remove the special rights of Māori that Te Tiriti O Waitangi has enshrined (ACT Party, 2023b). In this referendum, a large majority of non-Māori would likely vote against Māori interests, dividing the country on its foundational document's meaning and generating a wave of neocolonial racism (Watkins, 2023). The leader of the populist NZ First Party, Winston Peters, also went as far as to question the status of Māori as indigenous people and made no secret about his fundamental climate change denial (Oldfield & van Veen, 2023; A. Smith, 2023).

Nora said, “No, would be the simple answer. It’s disappointing that there’s no teeth to what’s been put out” (Nora, Interview #3). Nora said that while the government uses rhetoric acknowledging the urgency, their actions don’t show they believe their own words. “It’s pretty scary, actually”, Nora added. She also raised concerns that the country used its financial resources to battle Covid-19 and is now left with little to fight climate change. Nora thought the lack of urgency might stem from peoples’ “hope it won’t happen in their lifetime or something” (Nora, Interview #3) and added that she found the lack of progress “quite overwhelming in the past 12 months” (Nora, Interview #3). Talking about her work with young activists, she believes that “radical spaces and radical discourse and radical democracy” (Nora, Interview #3) are needed to move society forward. She said she is frustrated that people’s voices do not really matter and added, “I think radicalism is the only, like, peaceful radicalism if such a thing exists, is really in being okay with having to move into those more radical positions, is actually the only chance that we've got of changing things” (Nora, Interview #3).

> My reflection: *Nora expresses what many climate activists seem to feel, that the current political system is not yet woken up to the magnitude of what is at stake and what would need to change in society to make the difference required. CAT’s do not see themselves as commenting bystanders. However, because they feel the pressure to educate the coming generation in the hope of bringing about the people who will rise to this challenge, they feel a particular dread about governmental inaction. Like some of the radical climate protest organisations such as Extinction Rebellion or Just Stop Oil, Nora sees radicalism as the only line of flight on which the assemblage of society might be able to generate the momentum required to approach the climate emergency with some hope of achieving the required mitigation. Deep down, I believe that Nora might be right.*

Karl thought that there are a lot of countries that are far worse in regard to the political focus on climate change than Aotearoa but pointed to others that are better. Karl thought our small size and geographical advantage would make our country an interesting example. Karl pointed out that Aotearoa is currently importing coal for power generation and thought, “That’s crazy” (Karl, Interview #3). Aotearoa currently produces about 80% of its electricity fossil-fuel-free and could have 100% renewable electricity generation if the country would prioritise it. Politically, Karl pointed to the powerful lobby of the dairy industry, our country’s largest emitter of greenhouse gasses, which he thought was being instrumentalised as a political weapon by the centre-right National Party of Aotearoa against the centre-left governing Labour Party and their developing climate change policy at the time of the interview in 2021.

Jacob thought that despite a lot of inertia, "people are beginning to start waking up a wee bit to it, and it's starting to shift that way. But it's still got a massively long way to go" (Jacob, Interview #3). Based in a rural dairy farming community, Jacob was worried about the far-right farmers' movement, Ground Swell (Gibson, 2021), that agitated the rural community against governmental regulation, carbon taxes and similar policies. It resulted in mass protests by farmers blocking city traffic with their tractors. Jacob was concerned about populist short-term localism at the expense of the long-term global view we need. He said, "People need to take their heads out of the sand, and the heads out of the paddock, perhaps, and actually realise that what we do today will affect future generations, not just in New Zealand, but around the world" (Jacob, Interview #3).

Jacob's and Karl's concerns played themselves out after these interviews when the Ground Swell movement continued its protests with farmers, who are furious against government climate change proposals, using their tractors to block roads in main centres in the lead-up to the 2023 general election in Aotearoa (Cook, 2022; Hollingworth, 2023). These protests pit the farming industry, Aotearoa's largest emitter of greenhouse gasses, against the aspirations of mitigating climate change. The heightening of the conflict between parts of the farming communities and climate action has implications for the ability of the government to make effective emissions reductions in the most polluting part of the country's economy a reality. The heightening tensions in this conflict have direct ramifications for climate change education and the wellbeing of climate activist teachers in rural areas of Aotearoa.

Findings and Implications

The participants believe that the national climate change policy is not on track to lead to an effective transformation of society. While the participants see an awakening in the population to the climate change problem as promising and in line with the centre-left and Green Party-led government at the time of these interviews, in their minds, this is overshadowed, as Karl and Jacob pointed out, by right-wing voices in opposition at the time of the interviews, who are instrumentalising anger against the country's climate change policy, especially in rural farming communities. Sadly, reactionary, neo-colonialist, right-wing populist movements seem to increasingly trouble democracies in recent times (Messina, 2022). These movements are potentially diffractive for Aotearoa's resolve to engage with climate change proactively. The right-wing ACT party's desire to repeal Aotearoa's climate change legislation and revoke virtually all the country's climate change policy poses a considerable threat to the country's future engagement with climate change (ACT Party, 2023a; RNZ, 2023). This will also affect education, as the right-wing parties indicated their desire to strengthen core subject teaching and indicated a stronger focus on standardised assessments and outcome focus at the expense of

exploration and teacher autonomy. The ACT party wants to outsource curriculum writing to private enterprises and encourage forming more private charter schools (ACT Party, 2023c).

The drift in the political landscape to right-wing ideology in Western democracies (Forchtner & Lubarda, 2023) directly threatens the desires and hopes of the participants and myself that society will educate itself consciously out of the crisis we are rapidly approaching.

6.2 Is The Education Policy Development on Track?

The participants' perceptions and responses show a significant level of frustration over the lack of emphasis by the government on climate change education, which has not been a priority by the Minister of Education despite appeals to the Minister (Bolstad, 2020; Everth et al., 2021; J. Ritchie, 2022).

The participants provided answers to the question: Do you think the Education policy in Aotearoa is moving in the right direction regarding climate change?

Anne complained that there seems to be no policy so far to foreground education for climate change. Further, Anne believed the education system is moving backward and thought that the system is at the moment in the process of taking the environment out of the Education for Sustainability subject. She said, “We know that [they are] changing the title for education for sustainability standards, to take environment out of it. It’s, I mean, that’s just sustainability. That’s bizarre” (Anne, Interview #3).

Sarah said that for now, the education system regards climate change as a side topic. However, she is hopeful things are changing. She is encouraged by community engagement in working toward climate goals and mentioned the fact that educators are coming together as a ‘coalition of climate change educators’ in nationwide hui [meetings] through the work of Connor Twyford and the NZEI teachers union (*NZEI Te Riu Roa*, n.d.) to discuss the future of climate change. She said, “I've also been involved in more and more hui and gatherings around the coalition of climate change educators in New Zealand, which gives me huge hope” (Sarah, Interview #3).

Karl was convinced that the education policy is not on track and said, “I don’t really see much progress at all, in terms of the kind of infrastructure of education” (Karl, Interview #3). He complained that education policy changes far too slowly and “there’s nothing systemic” (Karl, Interview #3) in how climate change education is organised. Karl again raised the matter of a lack of climate change in the curriculum and said that it should make up a major component.

Moana was encouraged about the passion with which individual teachers being environmental education into the classroom. She said, “I think it's not so much policy, but you've got some real champions and some real eco warriors within education. I think that's born upon more for personal reasons. And then those interests and those passions are brought into the classroom” (Moana, Interview #3). However, she argued that the secondary school space suffers from the assessment pressures of the NCEA system. She said, “I know Secondary School spaces can do a lot better as well. The pressures, I suppose, of NCEA overshadow that”. Moana again emphasised her view of the importance of the Te Ao Māori perspective for climate change education. She commented on her work with a new set of NCEA achievement standards for year 11 students that bring Mātauranga Māori into the scope of teaching and assessment. She said, “I was able to, again, marry up those with Māoritanga. So bringing in that aspect and that perspective of Te Ao Māori again, to firstly, engage the learners, make them feel connected to the learning” (Moana, Interview #3).

Nora felt that there was a rise in awareness and willingness among teachers to engage with climate change education and to do it well. Young people and a growing number of parents are aware and want this engagement. Nora thought “education might be in a position to really push and put pressure on” (Nora, Interview #3). Like Sarah, Nora also mentioned the efforts by Connor Twyford and the NZEI teachers union (*NZEI Te Riu Roa*, n.d.) as an encouraging development. The NZEI is the largest teacher union in Aotearoa and has employed Connor Twyford to engage members with climate change by forming a group of climate change educators (NZEI, n.d.). The most important action now, Nora said, is “getting that message across to policymakers” (Nora, Interview #3). Nora is also hopeful that in social sciences, there is a “much greater focus on the collective sort of trying to strip away and move back from the individual neoliberal focus that has just permeated everything for the last 40 years” (Nora, Interview #3).

Brent, teaching at a rural school, felt that climate change is not high on the agenda there and did not think education policy was on the right track from his perspective. He said, “No, I say that from a rural school perspective because it’s just one of those things that just doesn’t matter” (Brent, Interview #3). In general terms, talking about the Aotearoa education system, Brent said while the intention to do something about climate change education is there, “New Zealand education, so far, is very wishy washy” (Brent, Interview #3), reflecting on the lack of clear commitment by the Minister of Education to make climate change a priority (J. Ritchie, 2022). He mentioned that there are significant curriculum updates on the way regarding the inclusion of Māori worldviews and Tikanga, which Brent said is also beneficial for the climate issue.

Freda said she saw pockets of engagement with climate change education but no unified educational initiative. She believed climate change education needed to be "mandated with direction" (Interview #3) and well-resourced as a national policy. Freda emphasised that climate change education should be a cross-curricular effort rather than becoming a subject. She said, "I don't think it needs to become a topic that's taught. I think it needs to be in the background of everything we do" (Freda, Interview #3). Freda thought environmental concerns should become "a bit of a priority over some of the other stuff that they do" (Freda, Interview #3).

Jacob was "cautiously optimistic about the new curriculum that's coming in for NCEA" (Jacob, Interview #3) but believes that we need to "upskill the whole population" (Jacob, Interview #3). Jacob was critical of the "dogmatic adherence to have to know XYZ to pass an exam" (Interview #3), which, as Jacob put it, "is great if you just want people to repeat the same mistakes we've been making for generations" (Jacob, Interview #3) and stifles what teachers can do in class in reaction to the climate emergency. Jacob confirmed that the critique of the NCEA exam pressures and conformity to abstract norms is a key concern for making climate change education a central topic within the school system in Aotearoa.

During the years since I started this research project, the idea that a formal climate change education initiative was needed has gained currency in educational circles. Together with education researchers, my supervisor and fellow PhD students, I wrote a submission to the consultation on draft advice to the government by the Climate Change Commission with the appeal to foreground education in order to prepare the electorate for the necessary policy steps required in climate change mitigation and adaptation. We subsequently published our appeal as a paper for the education community in Aotearoa as an appeal for the generation of capacity for climate change education (Everth et al., 2021). However, in the final advice to the government and in the subsequent emissions reduction plans of the government, education remained little more than an afterthought (MfE, 2022b). So far, climate change education has yet to become a focus of the Ministry of Education (J. Ritchie, 2022). It has been largely left to inspired teachers to prepare and share resources (Carvell & Ritchie, 2020), which were made available through the New Zealand Association for Environmental Education, NZAEE. The resource developed by Carvel and Ritchie (2020) was initially supposed to be published as an official resource by the Ministry of Education. However, the Ministry received strong opposition from the meat producing industry because the resource suggested correctly that lowering the consumption of red meat could reduce individual carbon footprints (Kelly, 2020). This dispute demonstrates again the strength of the farming lobby in Aotearoa, that not only has limited the country's emissions reduction efforts but has now interjected itself into climate change education.

Findings and Implications

In summary, while some participants see hopeful signs of greater recognition of the need for climate change education, they complain about the education system's systemic lack of and deliberate effort to make climate change education a central issue. As Fred said, there was a lack of a unified initiative. Or, in the words of Anne, what was missing was policy that would foreground climate change education. As Brent put it, the engagement of the education system with climate change was so far perceived as being neither here nor there. Drawing these comments together into a DeleuzoGuattarian perspective, the perceived lack of a unifying climate change education policy is likely due to the significant inertia in the system stemming from its diffraction into many sub-assemblages based on subject areas, both in the curriculum development and the assessment bureaucracies. All these assemblages can be seen as territorialising and coding machines that resist systemic transformation. The system tends to treat new educational ideas such as climate change as add-ons, handed to particular curriculum areas or patched onto others as part of increasing eco-literacy but not as "fundamental to our ability to survive, function, and thrive within planetary boundaries" (R. Iyengar & Kwauk, 2021, p. 324).

In summary, the participants perceived the education system as not on track at this time and in need of developing strategies to enable meaningful climate change education. The examples of opposition to climate change education from the farming sector show that climate change has been turned into a political football by the country's worst polluters, particularly the powerful meat and dairy farming lobby, with repercussions for official educational policy development. Together with the right-ward drift in the population and the likely switch to a centre-right coalition government after the 2023 elections that is highly sympathetic to and dependent on the votes from the farming community, it is doubtful that the government will make progress on climate change education soon.

6.3 Can the Lessons Learned from Covid-19 Inform Climate Action?

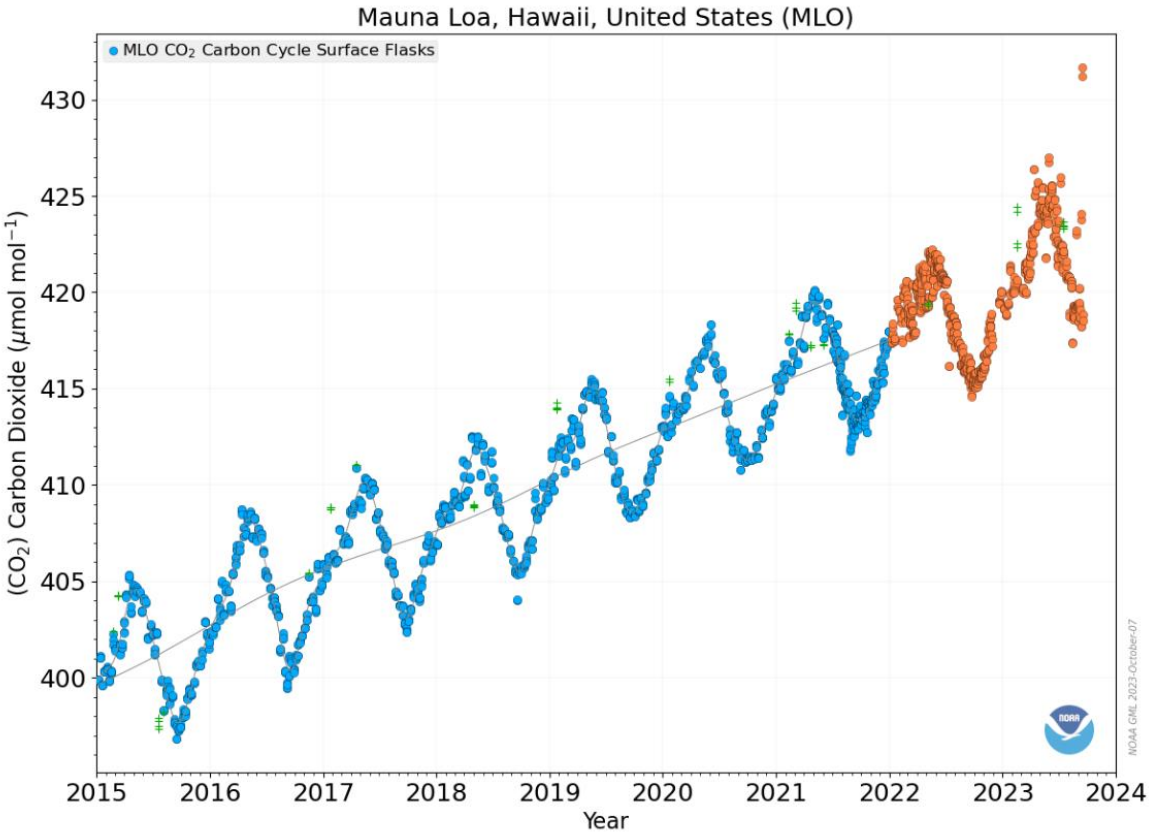
Climate change action has been compared to society's reaction to the Covid-19 epidemic (Bhusal, 2020; D. H. Cooper & Nagel, 2021; Klenert et al., 2020; Le Quéré et al., 2020; Manzanedo & Manning, 2020). There are obvious parallels. Covid-19 has caused society to work rapidly together on a global threat. However, it also energised dissent in the community against government policies that restrain personal freedom. These tensions will undoubtedly become an issue concerning climate change policy. For a while now, a confluence of anti-vaccine and anti-science activism, conspiracy thinking, and climate change denial has been building, which troubles the cohesion of democratic societies (Agius et al., 2020; Carpiano et al., 2023; Fiorino, 2022; Prasad, 2022; Tiller, 2022). Out of the anti-

vaccination activism during the Covid-19 policy times, a political party formed that calls itself 'NZ Loyal' (NZ Loyal Party, 2023), which combines anti-vaccine rhetoric with climate science denial in their 2nd position on their list of policies: "End any UN-forced climate accords based on faulty science and media-driven hysteria" (Policy position 2).

The government-prescribed behavioural restrictions and directives, including vaccine mandates for certain professions and activities, to limit the impacts of the Covid-19 epidemic had personal risk reduction benefits for individuals. However, personal sacrifice and personal benefits are largely uncoupled with respect to the physical impacts of climate change. Behaviour changes to combat the climate emergency have little direct individual benefit in actual climate outcomes as such. The compounding impacts of climate change will continue for centuries, and climate improvements due to behaviour change will not materialise in many people's lifetimes.

Figure 6-1

CO2 Concentration over the Covid-19 Years



Note. Image provided by NOAA Global Monitoring Laboratory, Boulder, Colorado, USA. Data shown in orange are preliminary. The black line is the long-term average where available.

Source: https://gml.noaa.gov/dv/iadv/graph.php?code=MLO&program=ccgg&type=ts

Looking at the development of the CO_2 concentration over the Covid-19 years in the Keeling Curve (see Figure 6-1), no significant moderation of the upward trend can be seen, despite the restrictions in air travel and other fossil fuel energy use over these years. In 2023, a resurgence of the growth of the CO_2 concentration seems to become apparent in the preliminary data for this year. This is a sobering realisation. The Covid-19 restrictions in activities, from flying to industrial production, seemed very significant. Yet this experience makes it obvious that the effort of bending the Keeling Curve downwards will need to be orders of magnitude greater than the Covid-19 restrictions. This puts into perspective the task ahead to educate the population into accepting and actively supporting such efforts. In light of the vigorous anti-covid-policy protest movement in many countries against restrictive government policies, this task is daunting. And indeed, as Fiorino (2018, 2022) asked, it is not a given that democracy will be able to handle climate change.

When asked what lessons can be learned from Covid-19 to inform climate action, the participants commented on the complexities of comparing the Covid-19 epidemic and society's response to the climate emergency.

The participants were asked: Do you think lessons learned from the Covid-19 epidemic can inform action on climate change?

Anne said, "And I think there's some lessons to be taken from Covid-19, which at least has the dark advantage of relatively fast cause and consequence and a very, very visual, social and economic consequence" (Anne, Interview #3). Anne added,

> I want the government media campaign on Covid-19 to transfer to climate change. We have a team that was created in council that's Covid-19 response, and they move fastish, usually a day or two behind, but they move fastish. It's a group of people that have a lot of say, they have a lot of power to get the message out. I think the vaccination buses, like they're very responsive. And that's the kind of response we need for climate change. They need to feel the communities, not just the wealthy ones, but also the minorities that aren't doing the voting, and they need to respond locally to those council needs to respond. My team needs to respond locally. And we don't. (Anne, Interview #3).

Karl said, "Yeah, I think that's a, it's a really interesting question. This whole Covid-19 situation has been very interesting in terms of a kind of, you know, experiment. I mean, it's just a big experiment, isn't it in human behaviour" (Karl, Interview #3). Karl pointed to the speed at which air quality in many parts of the world increased rapidly during the first lockdown. But he is concerned that everything

went quickly back to normal when the epidemic was brought under control. Karl said, “I think you can take this Covid-19 pandemic as an educational opportunity if you like. I don’t have a lot of faith that we will take those learnings. As soon as the lockdown ended, everyone got back in their cars. So, you know, did we learn anything? I’m not sure” (Karl, Interview #3).

Moana feels that the Covid-19 lockdowns had a positive impact. She said, “I hope [the lockdown] has taught people lessons around, you know, prioritising your life, and I think we’re so crazy busy trying to go from A to B and meet deadlines and be at this meeting that we really became disconnected and quite unhealthy. I thought the lockdown gave Papatūānuku a rest, and it actually gave people a chance to reset, and I hope that they took that mindset approach rather than, you know, complaining about the lockdown” (Moana, Interview #3).

Nora realised how Covid-19 has been pulling society apart, negatively impacting the cohesion needed to work on long-term issues such as climate change. However, she also pointed to the experience that Covid-19 provided to show that we can solve big issues. Nora said, “Covid is actually pulling us apart. But it’s a bit, yeah, I feel like there’s a juxtaposition, though. Because it’s also showing us that if we really want to pull together to solve a problem, globally, we can” (Nora, Interview #3).

Brent pointed to the complexity of the Anthropocene predicament and to the deep social issues that hinder united climate action on a global scale. Brent said, “I think there’s a whole lot of things that need to be addressed before the answer can even come forward” (Brent, Interview #3). However, Brent also saw a significant educational opportunity in the Covid-19 experience and the lockdowns.

Findings and Implications

The participants viewed the Covid-19 epidemic as an opportunity to model cohesive action of society against a fast-moving common threat. But they also viewed it as a warning, demonstrating how society can be “pulled apart” (Nora, Interview #3) on diverse reactions to policies and appeals for social responsibility with lessons for the evolution of climate change policy.

Nora’s concerns seem vindicated by the political developments since the interview. Indeed, the current climate in Aotearoa prior to the 2023 general election shows that the population is no longer supporting the Labour Party that led the country through the Covid-19 years and won an outright victory in the 2020 general election. After the Covid-19 years, society seems tired of state interventions that infringe on people’s liberties, which fuels anti-government sentiments. The current populist and right-wing political turn comes at a critical time for the future of climate change politics and poses risks to the ability of the state education sector to respond cohesively to the climate emergency through policy. In fact, the right-wing ACT Party, who were engaged in the process of

coalition talks for forming a centre-right government with the National Party after the 2023 election, vowed to repeal the climate change legislation and climate change policies enacted by the Labour/Greens coalition during the six years in government (ACT Party, 2023a; Wannan, 2023). As Karl remarked, the learnings from the Covid-19 epidemic may prove short-lived.

6.4 Participants' Reflections on this Research

The closing interviews gave the participants an opportunity to sum up and reflect upon their experience over the course of the year they engaged with this research. Without prompting, some of the participants explicitly expressed that they got something important out of the research process themselves, which, from the perspective of reciprocity and research ethics, was important for me to know.

Brent said:

> Thank you for having me on. It actually was a total highlight of my past year. So, I thank you so much. Yeah, it's been nice to reflect on this. I have some new bounce of ideas and confirm where I am, I guess, yeah. And just really challenge everything that I have learnt and focus my ideas more specifically. (Brent, Interview #3).

Ella said: “Thank you so much. Thomas. It's been a really interesting process” (Ella, Interview #3).

Sarah said:

> And um, yeah, really, really honoured to be part of your study. And it's sparked a lot of new lightbulbs inside of me and within my education journey. And I think through your research, I've also been involved in more and more hui and gatherings around the coalition of climate change educators in New Zealand, which gives huge hope (Sarah, Interview #3).

Karl said:

> I just like to thank you, Thomas, for doing this research, I think it's really important that people are doing this, this kind of thing. I think it seems to me that you have a very, you know, very, very clear understanding of the problems here and, and the 109 potential solutions. So, I'm very, I'm heartened by the fact that people are doing this work. (Karl, Interview #3).

I expressed my gratitude to all participants for their time, effort, and engagement during the research and am honoured by the significant amount of narrative they contributed to this research. Collectively, the participants generated over 300,000 words of transcribed interviews as well as their valued contributions in the form of assemblage drawings.

6.5 Summary

The closing interviews augment the data gathered from the primary interviews and the assemblage drawing interaction with responses to specific questions and in response to the current events of the time. The responses highlighted the complexity of the societal assemblage in Aotearoa with respect to the Anthropocene predicament and the climate emergency. The participants see Aotearoa as being neither on track as a whole nor with respect to the education system's progress to respond adequately to the climate emergency. The roadblocks to climate change education that Kwauk (2020) analysed still seem to remain firmly in place in Aotearoa at the time of these interviews. In order to fulfil the aspirations of the UN Sustainable Development Goals in Education, SDG 4.7 (United Nations, 2015), Iyengar and Kwauk (2021) argue that "[a] radical vision for education is needed at all levels of the education system, local and sub-national as well as national" (p. 324). However, the perception that such a vision and radical ideas on which, as Iyengar and Kwauk argue, "[t]ransformative education agendas thrive" (p. 328), has so far been missing from the Ministry of Education, emerged as the unifying theme from the participants' voices. And unless such a vision is clearly stated, the response of the government and the education system to climate change will remain 'wishy-washy', as Brent put it.

With regard to Covid-19, the hopes of transformative lessons learned from the epidemic appear to fade in light of the political shift seen in the 2023 national elections away from the Labour and Green coalition government and toward the political right, which likely benefitted from the rise of noncompliance and nonconformity attitudes during the Covid-19 epidemic (Salman, 2023). This does not bode well for expectations of compliance and conformity with climate change-related behaviour change policies and possibly mandates in the future.

7 OUTCOMES

This research set out to investigate how climate activist teachers perceive themselves, the education system, and their role as educators with respect to the climate emergency, and to listen to their desires for change of the education system in response. During this research project, 17 participants were engaged in a year-long ethnographic study. The research adopted a pragmatic realist ontology and the conceptual framework of Deleuze and Guattari, whose ideas have been increasingly instrumentalised in social research for the context of the Anthropocene.

This research started with the following research questions:

- How do Climate Activist Teachers perceive themselves, the education system, and their role as educators with respect to the climate emergency?
- What are Climate Activist Teachers' desires for changes to the education system in response to the climate emergency?

In the following sections, a summary of the findings in response to these questions is presented, followed by a discussion of implications arising for education. The chapter then concludes with a section on academic outcomes, where key outcomes of this research are contextualised with the literature. Finally, an outlook toward future research is presented.

As stated in the introduction, this thesis was compiled in the form of a rhizomatic structure. Rhizomes are best explored through sampling, frequent lateral movement and repeat encounters with the dynamic nodes and vertices that reveal themselves. Therefore, the summary in section 7.1 presents a retrace of the important nodes from the results, findings, and analysis in the rhizome that this research traversed. As a repeat encounter, the content may now be familiar and may read repetitive. This is not unintended. Novelty is actualised from the virtual in the productive dialectic of difference and repetition (Deleuze, 1994).

7.1 Summary of Findings: Milieu, Desire, and Directions

The participating climate activist teachers in this research reported their perceptions of territorialisations in the milieu in which they work. Many of these perceptions point to issues that trouble the engagement with meaningful climate change education. In response, they expressed desires for changes in the education system, the will to be the change-makers to promote this change and suggested and employed strategies toward these goals.

Here, the key observations raised by the participants about the milieu are paraphrased and interspersed with summaries of the desires and strategies they developed in response. The statements of desire are typeset in italics. Furthermore, directions are added based on the analysis of implications from the findings on how the education system, teachers, and school leadership, in particular, could address these points.

7.1.1 Point of Inflection

The question I asked myself repeatedly throughout this research was how the perceptions and desires of the participants could be transformed into action. One avenue could be to appeal to the education administration at the national level. However, reforms of the education system are progressing in long-term review cycles, which makes changes in the system slow to implement. Any changes, especially with such a consequential issue as climate change education, will also risk becoming subject to political interference. Climate change itself appears to be accelerating, as seen in the extraordinary events around the world in 2023 and the years prior (CFR, 2023; NASA, 2023; NIWA, 2023). Humanity does not have decades ahead to address these issues and to form a productive, adaptable, and agile response. Society needs to enable education to rapidly take a lead role in the preparation and transformation of society as envisioned by Irwin (2020).

However, in Aotearoa, within the school leadership of the principal and the school board, the latter constituted of elected members of the community, have significant freedom to construct the delivery of the curriculum by setting thematic priorities, structuring the middle management and faculty composition of the school, and directing the development of learning programs for the students. Due to this relative freedom, the assemblage of the school leadership team carries the ability and, as I argue, therefore also the responsibility, to enable climate change education at their school. I have argued this point with examples from this research and with examples from the research of my co-author in our paper on Climate Change and the Assemblages of School Leadership (Everth & Bright, 2022). Drawing from the data from this research and our paper, each of the following sections contains suggestions to school leadership in correspondence to points raised by the participants.

7.1.2 Deterritorialisations from Cornucopia

Not only is the future ‘already deterritorialised’ (Colebrook, 2020a), but the climate emergency is already generating widespread deterritorialisations in the present for society and the participants in this research. Becoming deterritorialised from the previous century’s cornucopian dreams is painful. Society has yet to verbalise the end of cornucopia coherently, partially because of a lack of clear vision of what is coming. Teachers are normally tasked to forecast the life ahead for the next generation in

positive, motivating, and hopeful narratives. However, once they become deeply aware of the severity of the climate crisis and the issues of Anthropocene overshoot in general, and therefore are in the process of becoming deterritorialised from cornucopian dreams of the future, they find themselves in unfamiliar and emotionally taxing professional territory.

The participants commented on their apocalyptic visions. Karl thought that if we do not solve climate change, then “nothing else matters”; Jessica said she was “terrified”; Ella said, “We are all screwed”; Claire thought, “We gonna lose this game”; Katherine thought we would pass tipping points beyond which there is no return to normality. The participants' sense of doom-to-come was almost universally shared. Moana, a Māori participant, however, did not express this sentiment. More on this will be discussed in 7.1.11 below.

Deterritorialisations result from assemblages losing their ability to maintain their territories and retain their constituent members. Deterritorialisations progress along lines of flight, terminate through reterritorialisation into new assemblages, or lead toward absolute deterritorialisation and nomadism. Strains resulting from concurrent human and ecosystem suffering due to climate change and the backcasting of dire climate change predictions into today’s context are mounting and generating growing tensions for education, as evident in the participating teachers’ testimonies.

This deterritorialisation from cornucopian futures is fundamentally shifting the core assumptions of climate change-aware individuals with respect to the future, and it deterritorialises meaning in the present. It is the background-drone within the Rhizomatic assemblage of nodes that connect to form this thesis.

Deterritorialisations from Cornucopia and their impacts are universal, and alleviating these would require a global and sustained effort to mitigate the climate crisis together with the core symptoms that evoked it. Physical and technological changes are unlikely to be sufficient, and a global effort to invoke behaviour changes would be required to shift social norms (Merz et al., 2023). Education has a key role in such a process, especially if it can overcome its traditional culturally reproductive stance.

> **Directions:** Education must recognise and accept its enabling role in bringing about the cultural change required to save humanity from its own actions. To wake up the education system to tackle this opportunity with abandon led to my desire to undertake this research. School leadership assemblages should formally recognise this challenge and begin planning school-wide climate education engagement. The testimony of the

participants should serve as the proverbial ‘canaries in the coal mine’ for triggering this process.

7.1.3 Professional Loneliness and the Overton Window

Because of their deeply felt deterritorialisations from Cornucopia, one of the almost universally repeated perceptions of the participants was a sense of loneliness in their respective schools and staffrooms. The participants reported that their colleagues were not engaging much with them on the topic of climate change, being agnostic or in denial about climate change, and avoiding engagement over the issue. Jacob felt “like you're the only person that gets it”, and Ella felt “really weird and alone”. The sense of loneliness with the climate emergency at school is a direct consequence of the deterritorialising effect the climate emergency has already had on these participants. The participants felt like outsiders in the assemblage of colleagues. This loneliness robs them of the benefits and positive impacts on mental health and wellbeing that collective action provides.

The landscape of educational discourse at schools is constrained by the normative powers of an Overton Window that maintains bounds on the range of views and messages that become part of a school’s learning culture. The assemblage of schools uses implicit and often explicit coding to control the bounds of this window as part of its territorialising habits. Engagement with the discourse over the profound social transformations required to mitigate and adapt to climate change remains largely excluded from schools. The still widespread explicit or silent climate change denial or agnosticism at schools among staff and leadership results in climate change remaining outside the Overton Window governing the discourse among staff and school leadership. School leadership in Aotearoa has a significant ability to direct the enactment of education at their schools and deliberately shift the post of this Overton Window.

> ***Desire:*** *The participants strongly desire to engage colleagues and school leadership in a constructive and critical discussion of planning for effective climate change education. Opening the ‘Overton Window’ that currently forecloses these discussions in many schools would be a significant first step toward overcoming the sense of the participants of being ‘lone warriors’ in their schools. Some participants employed small strategies, such as establishing a compost system for the food scraps in staff rooms to engage colleagues. However, apathy and outright ignorance by colleagues were reported by some participants, demonstrating how much work there is to be done in this space. Getting engagement, especially by school leadership, was seen as crucial.*

Directions: It is important for the education system to recognise the mental health issues arising from being alone with what arguably is humanity's greatest collective crisis while feeling responsible for the wellbeing of students and a meaningful education for their future.

For the assemblage of school leadership, this issue constitutes a matter of mental health and safety of their staff and, ultimately, their students. It is important for school leadership to recognise and reflect upon the concerns for the wellbeing of staff and students with respect to the climate emergency. Opening the Overton Window to invite the climate change discourse proactively into the school culture would be an important step to take for school leadership (Everth & Bright, 2022).

It will be helpful for teachers to join with others on social media channels or professional fora and networks to develop a sense of unity and collegiality beyond their immediate school. Over time, climate change awareness in the education sector will grow, and it could be one of the more satisfying activities of climate activist teachers to expand these networks actively in the orbit of their own connections.

7.1.4 Territorialising Arborescent Institutional Structures

The participants' narratives frequently reflected on the education system's structures as a hindrance to their desire for holistic and meaningful climate change education. The structures of the national education system, from the national curriculum to divisions of schools into subject areas, faculties, and departments, generate a nested network of assemblages that defend their existence through coding and territorialising actions. The learning time in high school education is fragmented into time-tabled parcels allotted to these structures and the flow of standardised assessment tasks set out in year plans (see Jacob's assemblage drawing 4.9.1). The participants understood climate change education as an all-encompassing cross-curricular objective that cannot be effectively allotted into small parcels within this structure or attached as an add-on to single subject areas. National educational institutions change slowly with decadal review cycles and are perceived by the participants as lacking the agility to respond to the demanding pace of the climate emergency.

Desire: *The participants voiced strong desires to deterritorialise the institutional structures in education and work toward meaningful cross-curricular engagement. Climate change education was seen as not anchored in any one specific subject. The science of climate change was seen as almost off-putting while contextualising climate change in a broad mix of social and political sciences, economy, and sustainability education was seen by the*

participants as central. Behaviour change was understood as the goal of climate change education. Jessica advanced her desire for change and the deterritorialisation of structures by "gentle infiltration" (Jessica, Interview #1) of climate change and environmental contexts into all her work across different learning areas. Strategies like these can enable a bottom-up cultural change at schools.

> **Directions**: The New Zealand Curriculum structures learning into subjects and year-appropriate learning levels. However, school leadership has the freedom to direct internal structures within their schools to adopt more holistic and cross-curricular approaches. It is well within the scope of school boards and school leadership assemblages to deterritorialise their schools to the extent desired by the participants while still fulfilling the overarching governmental objectives of the education system (Everth & Bright, 2022).

7.1.5 Territorialisation through Standardised Assessments

Many of the participants critiqued the role of the standardised NCEA assessment system and pointed to the territorialising impact of this system for their teaching praxis that drives the enacted curriculum at high schools in Aotearoa. Teachers' primary objective is to generate opportunities for students to gain credits in this system, and their annual teaching plan is structured in learning blocks designed around selected achievement standards. Thereby, the learning time in students' secondary school life is strongly territorialised by this system. The participants commented on the pressure they and their students are under to perform well against the NCEA standards. Not only does the NCEA system territorialise learning, but it also territorialises students' futures and career options through the awarding of credits and grades. This leaves little room for reconsidering education for social transformation in the time of the climate emergency.

Desire: *Because of the overbearing impact of the NCEA system on the enacted curriculum at secondary schools in Aotearoa, the participants strongly desired to deterritorialise the standardised NCEA assessment praxis to construct much more meaningful learning and assessment contexts. The participants' desires correspond with my own experiences in deterritorialising the NCEA system in my teaching practice (Everth, 2022b).*

> **Directions**: From my own teaching praxis, I gained the confidence to deterritorialise NCEA achievement standards and recombine them in new and meaningful assemblages. However, to do so, teachers will need the support of their departmental leaders and, ultimately, the school leadership. As mentioned above, the school

leadership has the opportunity and, as I argue, the obligation to engage with the effort of deterritorialising the assessment praxis so that meaningful and transformative course planning for climate change education can progress at schools. A deeper reflection of my own desires for deterritorialising the NCEA system in my teaching practice and in reflection also of the participants' desires together with suggestions for the deterritorialisation of standardised assessments has been published prior as an interim result of the thinking that this research work triggered (Everth, 2022b).

7.1.6 Hostile Physical Territories.

The physical locations where participants operate can be hostile to the climate change narrative. This is particularly so in some of Aotearoa's rural communities linked to coal mining, oil and gas production, and livestock farming. Livestock farming is the country's largest greenhouse gas emitting industry by far. Teaching about climate change in such communities is laden with potential conflict and subject to pressures from the community, local political power structures, parents, students, and schools. The participants, in particular Jacob and Harry, provided strong evidence of the challenges of teaching climate change in these communities, where the livelihood of the community and that of the families of students directly depends on the continuation of the climate-altering local industry.

Desire: *Participants teaching within 'hostile territories' have a strong desire to overcome the specific constraints of their locality but have no coherent strategy to do so. The feeling of being a 'lone climate warrior' is overwhelming in these hostile territories, and the magnitude of the task of engaging these communities with climate change education is daunting. Yet, the participants from these territories know the importance of educating these communities.*

Directions: The regionally challenging nature of community and school engagement with climate change education must be recognised by the educational leadership of Aotearoa. And this will apply in a similar way globally. Not only are these territories challenging locations for enabling climate change education, but they are also often territories where, due to climate change education, significant changes in public attitude to climate change mitigation could be achieved with the outcome that prime contributors to Aotearoa's greenhouse gas emissions become more amenable to necessary change. To achieve compliance with Aotearoa's Paris Agreement commitments (MfE, 2020), rural regions will need to switch from ruminant farming undertaken for generations to climate-friendly land use, such as growing produce or reforestation. Climate change education in and beyond the territory of schools will be necessary to overcome engrained resistance to implementing climate change policy in

these territories. School leadership in these areas will need to proactively engage with this topic in their communities and should be supported by the central education system in this task.

7.1.7 Territorialising Strata in Society

The participants pointed out that climate justice and social justice are interlinked and alluded to the risks due to poverty and social stratification for the enactment of effective climate change education. Strata generated by differences in privilege, poverty, culture, colonial injuries, and neo-colonial hostility constitute territorialising assemblages that restrict teachers' ability to engage students with climate change education. Environmental concerns have traditionally been a privilege of the middle classes with disposable income that could be used for 'sustainable' lifestyle choices, while poverty often constrains people to low-cost but unhealthy practices for themselves and the planet (Panarello, 2021; Rhead et al., 2018). For many families in Aotearoa, owning an electric car, for example, is currently unaffordable, and there is little to no leeway for purchasing based on ecological concerns.

Desire: *The participants are motivated by their experiences of the effectiveness of anchoring climate change education in the emotional space of social justice, equity and human impacts on nature and more-than-human life. They desire to address social justice and inequity in their communities to enable meaningful climate change education. Engaging students with climate change through social activism was a key strategy employed by some participants. Ultimately, the participants desire social justice to be embedded in governmental climate policy decisions and curricula. For the bi-cultural context of Aotearoa, the ongoing diffractions based on the colonial history of the country are generative of stratifications and social tensions. However, these tensions provide opportunities, as the participants recognised (see also 7.1.11 below). Addressing social inequalities goes hand in hand with the participants' desire to collectivise agency and appeal to ethics and social justice as motivators for raising student engagement.*

Directions: It must be recognised that social justice must go hand in hand with climate change mitigation and adaptation. Families with significant disposable income can afford to change their behaviour to mitigate personal emissions, such as switching to electric cars, installing rooftop solar panels, or switching their diet. For families who have little disposable income or savings or who belong to the group of one in five households in Aotearoa with limited food security (Ministry of Health, 2019), these options are marginal. This sets school classes up for unhealthy diffractions of students into groups of those who can report on climate-friendly choices of their families and

those who cannot do so. Social stratification will be a significant burden to the general acceptance of behaviour-modifying climate change mitigation and adaptation policies, including the significant cost of managed retreat from climate change affected areas (Peart et al., 2023). The education system must anticipate these challenges and prepare teachers and schools to encounter them constructively. School leadership needs to recognise the complex, intertwined nature of social justice and climate justice. Social strata must not be allowed to prevent students from taking part in meaningful climate change education that leads to climate action.

7.1.8 Territorialising Token Gestures.

The participants mentioned frustrations from the realisation that occasional class activities concerning environmental engagement, such as beach cleanups or sporadic conservation actions, often turn out to be no more than futile 'token actions' compared to the task of deep engagement with the Anthropocene dilemma. Such token actions were considered by some participants as 'feel good' deflections from the real issues. Anne remarked that such token actions make people feel good because they are attempting to "fix a problem that somebody else did, where personal behavioural change is about what you did" (Anne, Interview #1). Resistance to personal behaviour change remains the biggest obstacle to climate change education. Token gestures maintain the territorialising powers of dominant social assemblages by deflecting the energy that could be directed toward social change into generally accepted activities that support the status quo or make it seem sustainable. These actions are often associated with a rebound effect after a sense of "mission accomplished" (Gifford et al., 2018) satisfies environmental concerns and triggers an excuse to return to climate-damaging habits. Participants were concerned that ambitious school projects that end in disappointment because they are either unrealistic or the school was not prepared to support them appropriately are teaching students that failure is inevitable, with detrimental consequences for these students' future willingness and motivation to take on change-making projects.

Desire: *The participants desire to get away from typical token gestures seen in schools and engage with more meaningful education activities where students experience success and personal growth. Alternatives to the token gestures were cited in the desire for basing education much closer to nature, and concepts of locating entire schools in nature were mentioned. Long-term engagement in gardening, composting and food growing could provide meaningful learning contexts with visible outcomes.*

Directions: School projects are often of short duration, and frequently, the ambitions of these projects are larger than what can be achieved within the limited time and

resources available. Many projects end incomplete or in failure. A way around this could be to frame school projects as stepping stones along a much larger personal learning journey for the student rather than as closed 'mission accomplished' projects that are measured on their immediately achieved outcomes. If students conceptualise actions undertaken in school projects as steps and learning experiences in a much larger puzzle of solutions, which will take a long time and the collective effort of many, then experiences, even those of failure, could be understood as learning opportunities, thereby avoiding the 'mission accomplished' shortcut and rebound effect (return to old habits). School leadership needs to support authentic and meaningful change-making driven by students to enable positive feedback cycles from student activities. Longitudinal projects with measurable incremental progress that lead to behaviour change may offer such opportunities.

7.1.9 Hypocrisy and Cognitive Dissonance

Hypocrisy regarding the climate emergency remains commonplace in society. The participants were keenly aware of the risks of hypocrisy and cognitive dissonance for their mental wellbeing and the authenticity required for their position as teachers for their relationships with students and the wider community. Participants reported being aware of hypocritical behaviour of themselves and of others, and of coping strategies such as the rationalisation of climate-damaging behaviour as necessary or excusable, depending on the circumstances. Territorialising habits and coding of assemblages of the cornucopian culture are sustaining hypocrisy and generate avoidance behaviour as a response to cognitive dissonance. This applies also to the systems of education and the behaviour of the assemblages of many schools and their leaderships.

Desire: *Participants desired to reduce hypocritical behaviour by making lifestyle changes to relieve cognitive dissonance within their own lives and to improve the authenticity of their positionality as climate activist teachers. Some participants purchased electric cars, changed their diet, engaged with home gardening or solar energy, or expressed the desire to do so. However, linking to the points made before on social stratification, the participants were aware of their privilege of having the means to alleviate hypocritical behaviour while many of their students' families may be unable to do so. The desire to address social inequality goes hand in hand with addressing the desire to reduce cognitive dissonance and hypocritical behaviour.*

Directions: Making hypocritical behaviour explicit can lead to triggering behaviour changes and alleviate underlying stress arising from cognitive dissonance. Hypocritical

behaviour of institutions can push individuals involved with these institutions on lines of flight away, while owning up to this behaviour and addressing it explicitly can show leadership and generate constructive engagement of members of these institutions toward addressing the underlying issues and turning deficiencies in behaviour into opportunities for learning and development. School leadership should encourage explicit engagement with situations that generate cognitive dissonance and avoid hypocrisy in its own actions.

7.1.10 Apathy, Anxiety, Despair and Awakening

The participants reported that apathy, anxiety and even despair among their students were provoked by the deterritorialisations of visions of the future. Apathy toward the climate change problem among students can be an avoidance reaction and a sign of hopelessness and internalised despair. The participants' narratives demonstrate that they are confronted with a tightrope walk between raising the problem of climate change and avoiding the amplification of anxiety and despair. Participants were concerned about the risks to student self-esteem and development of agency when collective projects end in failure because aims were set too high or the circumstances of the deeply territorialised school life precluded meaningful outcomes. Dealing with the frequent doomsday messages about a coming climate catastrophe to which students are subjected in the media while being stuck in an educational system that so far does not give space and capacity to confront these issues constructively generates anxiety and despair for teachers, too. The apathy concerning the climate emergency reported by the participants among their colleagues may also be an avoidance reaction triggered by the cognitive dissonance between realising the magnitude of the crisis and experiencing a sense of helplessness within an education system that is not addressing the issue.

Desire: *The participants desire to engage students in the climate change education context and counteract anxiety and despair in their students. The participants saw collectivising agency among students as a desirable strategy to awaken hope through collective actions and a sense of collective achievement. However, it is difficult to generate collective agency for teachers working in a school where the climate change topic remains sidelined or even actively suppressed.*

Directions: A promising strategy for the conversion of apathy, anxiety and despair into an awakening of hope is the collectivisation of agency (Nairn, 2019). The participants' observations during the nationwide school climate strikes of 2019 provided a window into the actions of school leadership assemblages and their impact on the ability to achieve the benefits of collective action in schools. School leadership has the potential

to generate and facilitate collective action through the proactive deterritorialisation and decoding of educational institutions and their leadership practices (Everth & Bright, 2022).

7.1.11 Bicultural Opportunities

The participants acknowledged the ongoing resurgence of the Māori cultural identity movement in Aotearoa and reflected on the process of inclusion of mātauranga Māori into school curricula. Climate change is linked with the colonisation of the planet by the extractive Western industrial civilisation. In looking for pathways to the future, indigenous philosophies, sustainable lifestyles of indigenous cultures and their knowledge are gaining attention. For Aotearoa, the ongoing discourse between Western culture and the momentum of indigenous revival offers unique opportunities for engagement with the climate emergency. The participants recognise this potential but are also aware of the prevailing social inequalities that trouble the capacity of Tangata Whenua to give climate change mitigation, adaptation, and education much attention when poverty, healthcare, and social deprivation present more immediate matters to address.

Desire: *The participants desired to deepen their engagement with indigenous worldviews and wish that the education administration would use the example of the direction of the inclusion of mātauranga Māori into curriculum and assessment as a blueprint for directing engagement with climate change education. They saw the potential to integrate climate change education with the bi-cultural discourse and said that engagement with indigenous cultures can also be a pathway for the critique of Western socio-economic constructs that lie at the root of the climate emergency.*

Directions: The engagement with indigenous cultures can be understood as a gateway toward questioning the paradigms of the relationship of humans with the more-than-human world. Deterritorialisations from the normative confines of Western consumer society and the capitalist principles that confine society to an unsustainable dependency on growth can lead to the development of nomadic capacities and, eventually, the ability to envision and enact cultural transformation. Participant Tanya created a social anthropology course at her school with the aim of educating her students towards such an end. School leaders should take the initiative and bring cross-cultural dialog and learning, but also the questioning and un-learning of, and deterritorialisation from, preconceived oppressive and climate-damaging normality into their classrooms. Ultimately, climate change education must be education that leads to climate justice and to society stepping away from destructive habits. The

inclusion of mātauranga Māori into the curriculum and assessment opens pathways and opportunities that are unique to Aotearoa.

7.2 Implications for Education

At the outset of this research, a publication by Kwauk (2020) on the roadblocks to quality climate change education provided signposts for some of the constraints in the educational milieu that this research encountered. Kwauk condensed these roadblocks into five themes in a keynote presentation at the 2023 NAAEE Research Symposium (Kwauk, 2023):

- Competing priorities
- Lack of radical vision
- Problem of 'definition of scope'
- Poor monitoring & accountability
- Lack of support for teachers

In this presentation, Kwauk traced the steps needed to progress from a state of climate injustice to climate justice through education on a path from *conformative* (education as we know it, education *about* climate change) to *transformative* praxis (education for *climate action*, education for *climate empowerment*, education for *climate justice*) (Kwauk, 2023). Education for climate justice centres on the underlying socio-economic drivers of the climate crisis. It aims to defuse the harmful power of the oppressive, discriminatory, and environmentally destructive assemblages at the root of the Anthropocene predicament.

Kwauk's (2023) first two points were readily confirmed by this research. The findings of this research show that the current educational milieu, as perceived by the participants, holds quality climate change education back because the assemblages of the education system and the circumstances of an unjust and inequitable society restrain educational praxis into a conformative stance through coding and territorialisation by reference to a plethora of competing priorities, normative processes. Foremost, though, a lack of radical vision at all levels of education management is so far apparent.

Kwauk's (2023) second and third points are concerning the future. Despite a fast-growing number of publications in the field of climate change education, a generally accepted 'definition of scope' of what climate change education should be and how it should be implemented appears to be lacking. This is perhaps understandable for two reasons: Firstly, climate change and related symptoms of Anthropocene collapse dynamics present a fast-moving target. Whatever definition and scope are

adopted of what climate change education should look like will necessarily need to be dynamic or procedural and must be able to adapt to the changing physical realities in a warming world. Secondly, the development of definitions and scopes will be an interactive process where practical steps in experimental climate change education and the experience gained, theoretical development, and scoping and sculpting of definitions and policy will cycle repeatedly, not unlike research following a grounded theory approach. I argue that we cannot scope and define climate change education until we are in the 'thick of it' and have experience. There is no precedent to the current situation of education at the precipice of a potential global civilisation collapse, the "Teaching at Twilight" (Afzaal, 2023).

Based on the findings of this research and condensed out of the perceptions of the milieu and the desires of the participants, I argue below for specific interventions to move education a step further toward transformative praxis.

7.2.1 Implications for Educational Policy

Following the passing of the Zero Carbon Act (Climate Change Response (Zero Carbon) Amendment Act, 2019), the government of Aotearoa declared a climate emergency (New Zealand Parliament, 2020), signalling the urgency for change. In a democracy, political power is constituted through elections. However, there remains a considerable amount of scepticism in the population about the causes of climate change and the actions required to mitigate and adapt. Besides technological advancements for the transition away from fossil fuels, mitigating and adapting to climate change is mainly a matter of affecting behavioural change. Facilitating a just transition to a net-zero carbon economy constitutes an unprecedented educational challenge. Therefore, I argue that climate change education should precede climate change policy design and implementation. This point has been repeatedly made in the literature and also by myself and several co-authors in a submission to the draft consultation document by the New Zealand Climate Change Commission (Climate Change Commission, 2021). We also summarised our points made in this submission in a paper early in the progress of undertaking this research (Everth et al., 2021). In this paper, we suggested a set of policies that remain valid today and are now supported by the outcomes of this research.

Resonating with and expanding upon the points made in our paper, I argue for,

- The establishment of a National Climate Education Council. This council would be mandated to lead and coordinate climate change education and climate change education research in Aotearoa and coordinate the education response of the government to climate change. Central to all planning for climate change-related government policy decisions should be

educational outreach that pre-empts policy discussion and consultation, establishes matters of science facts, counteracts mythologies and conspiracy thinking, and lays the foundations for constructive policy discussion with the electorate.

- Establishing a mandate for school leadership to engage proactively with climate change education as a matter of priority in their schools, and I argue for establishing an education leadership outreach programme that engages school leadership teams with the climate emergency problem. This programme would provide leadership training and advocate for a systemic pivot of school culture to foreground sustainability education contexts across all learning areas. School leadership has a profound opportunity in Aotearoa to become change leaders and enablers and supporters of the remaining points I am making (Everth & Bright, 2022).

- Mandating the establishment of cross-curricular learning teams in schools that deterritorialise last century's divisions of schools into faculties, departments, and subjects. Real life is not compartmentalised, and a broad range of skills and good teamwork needs to be applied for problem-solving. Climate change affects all curriculum areas and should be addressed through learning and assessment tasks that are co-constructed by teachers across subject areas. Learning activities from my own teaching praxis showcase some of the benefits gained through cross-curricular course planning, learning and assessment (Everth, 2021).

- Capacity building for teachers to become the facilitators of climate change education through state-funded professional development courses that upskill teachers not only in the basic facts of climate science but, in particular, with an understanding of the profound socio-economic and cultural implications of climate change mitigation and adaptation, and with strategies to engage students with meaningful learning that reduces anxiety and generates hope.

- Policy to deterritorialise the coding and moderation practice of NCEA assessment standards as indicated in Everth (2022b). There is no evolution without variation. What is needed to foster evolutionary processes in education is the freedom and encouragement to vary from normative repression. Teachers should be encouraged by NZQA to interpret the NCEA standards liberally in order to allow agile and creative application of the existing standards to the rapidly changing context of a climate-altered and socially-stressed world. I argue that such a deliberate deterritorialising and de-coding directive issued by NZQA could rapidly unleash a wave of creativity in teacher planning and student engagement without much cost to the system. At this point in our history, it is indefensible to adhere to irrelevant fine-grained

directions in achievement standards for nationwide standardisation of assessment outcomes. What is instead needed is creativity and student-teacher co-creation of cross-curricular learning contexts in local environments that allow education to transform itself and become socially transformative.

7.2.2 Implications for Teachers

It is reasonable to assume that many teachers will find themselves reflected to varying degrees in the narrative of the participants. However, climate change is not yet generally foregrounded in education, and a continuation of the status quo remains tenable for probably most teachers today. Ambiguity and denial likely remain a common response. However, climate change is progressing rapidly (Hausfather, 2023; NASA, 2023), and tipping points are now near (Wunderling et al., 2023) that will bring the topic into focus for all, if not now, then within this decade. The narratives of the participants offer a preview of the complex issues that await teachers, especially as education moves from teaching about climate change to tackling the root causes of climate change and becoming actively engaged in the process of transforming society.

Students today have grown up with climate change talk and, therefore, will have somewhat normalised this discourse as a constant backdrop to their lives. However, they are nevertheless profoundly affected by the expectations of doom in their futures. Teachers will need to be prepared to respond. The pressure on the education system to make climate change and sustainability education a central objective will only grow as the dynamics of climate change progress. The tensions between climate science, observations, and impacts on one hand and the lack of cohesive political action on the other will also rise. Especially for teachers in communities in Aotearoa with emissions-intensive industries, particularly livestock farming communities, social and political tensions arising between climate mitigation policies, climate impacts, and climate activism will affect their wellbeing and their ability to teach about climate change and its causes and consequences.

These developments will put growing pressure on the government to engage proactively with the development of comprehensive climate change education policies. However, failing the implementation of such policies, climate change education will remain a bottom-up struggle by individual inspired teachers and occasional school leaders in the way it was chronicled in this research. Engaging with groups of other climate educators would benefit teacher wellbeing and the success of a bottom-up approach to climate change education. The teacher union NZEI (*NZEI Te Riu Roa*, n.d.) has been engaged in this work and arranged conferences on climate action for educators.

Climate change will undoubtedly spur further student actions in the wake of the global student climate strike movement in 2019, as chronicled by Bright (2023). I refer to her research for a comprehensive discussion of student agency, motivation, and learning in connection with the climate change dynamic. Many of the findings from her research dovetail with the voices of the climate activist teachers who participated in this research.

Giving advice to teachers, I would like to point to Jessica's (Participant) tactic of "gentle infiltration" (Jessica, Interview #1) to contextualise societal transformation in response to climate change into their subjects as a way of practising nomadic strategies. Further, I encourage secondary school teachers not to be intimidated by the territorialising power of the assessment assemblage but to apply the tools of deterritorialisation to oppressive structures in the system of education in order to foreground learning and exploration (Everth, 2022b). As my participant Karl said, we need to "stop tinkering around the edges" (Karl, Interview #1), explore radical and visionary ideas and make bold steps toward a sustainable future. Teachers have a key role to play in crafting this thinking, together with the students whose future is at play.

7.3 Academic Conclusions and Contributions

If the conceptual framework of DeleuzoGuattarian (Deleuze & Guattari, 1983, 1987) thinking is turned back onto the academic pursuit itself, academia emerges as a large rhizome of agential assemblages and theory-machines. These can be seen aiming to territorialise, but then also to deterritorialise and nomadise the processes of semiogenesis (Sharov & Tønnessen, 2021), sense-making, sense-building, generation of agency (e.g., Bacigalupi, 2022; Sharov & Tønnessen, 2021), and matter-transforming of the world[29]. Here, I summarise how this research connects with and adds to this rhizome.

Firstly, this research instrumentalised the DeleuzoGuattarian conceptual framework as the foundational semiogenetic toolset. In doing so, this research is situated in a growing assemblage of others who have built on DeleuzoGuattarian ideas. This is especially so with regard to the focus of this research on the state of humanity in the Anthropocene (e.g., Colebrook, 2020a; Fox & Alldred, 2020b; Harrison & Sterling, 2020) and the position of education in this context (e.g., Cole, 2022; Rousell & Cutter-Mackenzie-Knowles, 2022). The DeleuzoGuattarian concept of 'assemblage' was particularly helpful in this study. Understanding that assemblages are parameterised and attenuated in their agential capacity by 'territorialisation' and 'coding' (DeLanda, 2016) proved inspirational as a lens through which the assemblages within the system of education could be analysed and suggestions

[29] These processes were generally seen as the prerogative of human subjects, however, with the arrival of AI technology, these processes will take on a new dimension with yet largely unknown consequences for humanity.

made for the transformation of these assemblages with respect to climate change education (Everth, 2022b; Everth et al., 2022; Everth & Bright, 2022). This research suggests that the DeleuzoGuattarian conceptual reference frame is useful and productive as a theoretical anchor for structuring and analysing research components and findings and for deriving action-suggestions from the research.

Inspired by the substantial work of Fox and Alldred (e.g., Fox & Alldred, 2015a, 2016, 2021c), assemblage thinking was instrumentalised by this research for conceptualising research methodology. By using drawings to make assemblage thinking visible (Bazzul & Kayumova, 2016), this research demonstrated that the participants engaged enthusiastically with the generation of assemblage drawings, which not only gained semiotic agency (Pennycook, 2021) but were used to elicit rich data in follow-up interviews (Everth et al., 2022). This contribution to qualitative research methodology might inspire others to make assemblage thinking explicitly available to suitable research participants by giving them some of the DeleuzoGuattarian toolkit to undertake their own analytical introspections as part of the research process. In particular, such active participant involvement might be useful in post-qualitative research approaches (St. Pierre, 2021). This research undertook extensive interviews with the participants first, with an absolute minimum of researcher interaction, to capture data that were not affected by this methodological experiment.

Education theory is closely connected to epistemology (Scott, 2010) and, over the last decades, has been strongly influenced by constructivist theories that tend to sidestep ontology to the extent that protagonists of radical constructivism rejected the notion of a material reality external to the human mind as irrelevant (Peschl & Riegler, 1999). These theories are no longer tenable at a time when the agency and dynamics of the material reality itself, triggered by human actions, are now threatening the continuation of civilisation (Cowie et al., 2022; Kemp et al., 2022; Ripple et al., 2022; Wunderling et al., 2023). In fact, as has been discussed (Everth & Gurney, 2022), constructivism has had a detrimental impact by providing academic support to climate change denialism and tainted humanity's resolve to take the climate emergency seriously at a time when concerted action might still have had the chance to avoid the worst that is to come (Hansson, 2020).

New Materialist ideas evolved as a response to this adherence to constructivism, as discussed in Section 2.2. In particular, the work of Barad (2007), which positions ontology at the human scale as dominated by quantum mechanics, indeterminism, and the non-existence of relata outside of their intra-actions, gained significant following over the recent years. Barad's (2007) move can be seen as an attempt to restore the relativism inherent in constructivist epistemology back into the ontological turn through instrumentalising quantum mechanics. However, as I argued (Everth & Gurney, 2022), a closer reading of quantum mechanics with respect to decoherence theory (e.g., Zurek, 2021) restores

confidence in the independent and historised existence of relata, from subjects to objects, as propertied and dynamic agents in an on themselves as part of the tapestry of the material universe. The matter world does not manifest differently due to quantum mechanical effects in reaction to human social constructs but is subject to human-material actions on preexisting relata. The ontology suggested by this thesis conforms to critical realism (see 2.2.4). The critique of Barad (2007) based on quantum mechanics that the theoretical preparations for this research inspired (Everth & Gurney, 2022) might provide inspiration to others who seek ontological grounding for their work to read Barad (2007) with a critical stance.

For education, the academic contributions of this research are found in the affirmation that education can become the leader of the social transformation that Irwin (2020) envisioned if a ground-up evolution of the education system is brought about through deterritorialising actions of teachers and especially school leadership. The application of the DeleuzoGuattarian toolkit unmasks the components of the education system as territorialising and coded assemblages. It then becomes clear that deliberate deterritorialisation and decoding can enable the degrees of freedom the education system requires for seeking difference and breaking the cycles of normative constraint that keep education and society on track towards Cole's (2021) dystopian event horizon. Teachers and school leaders who engage proactively in this process can be conceived as DeleuzoGuattarian nomad war machines (Sidebottom, 2021). Cole (2022) claimed, "Understanding the matrix of deterritorialization, desire, climate change and learning, is perhaps the most important work that can be performed in the philosophy of education today and with respect to the future" (p. 1). This thesis has instrumentalised the DeleuzoGuattarian conceptual framework to this end. Academically, this thesis and associated publications may provide others with an example, data, and a stepping stone toward promoting this process.

Climate change education in the literature is frequently framed in the 'what' and the 'how' but seldom reflects on the 'who', the teachers, school leaders and other stakeholders in the education system, who need to drive climate change education. This thesis turned the tables and started with a significant subset of the 'who', the climate activist teachers and participants of this research. Based on this research, I argue that the 'what' and the 'how' questions of climate change education should be informed from the bottom up by enabling the 'who', the teachers, to become creative and empowered change makers who will construct the 'what' and the 'how' individually and collectively. This thesis' emphasis on the teachers themselves is an important contribution to the complex work of empowering education as a crucial lever for social transformation toward a sustainable future.

7.4 Limitations

Naturally, this thesis, being bound in time and scale, had to remain focussed on its central aim and, therefore, had to limit its scope with regard to other productive avenues of interesting and important discourse, critique, and perspectives. Furthermore, deliberate choices made also generated limitations. And foremost, being faced with the existential threat of climate change, providing an unbiased account is humanly impossible and not desirable within the context of this critical ethnography. I note and acknowledge in the following some points of critique that could be argued based on the limitations of this thesis.

- The choice of the DeleuzoGuattarian toolkit could be critiqued. Besides the already discussed postcolonial concerns voiced by Spivak (2015), one could follow the directions signposted by Pachilla (2022) and analyse the critique of DeleuzoGuattarian metaphysics coming from speculative realists such as Meillassoux (2009, 2016) and Brassier (2007), or critique Deleuze and Guattari from a Marxist perspective. However, such work would be very extensive and was not the aim of this thesis. The application of the DeleuzoGuattarian conceptual framework for this thesis is well positioned within the cited field of contemporary literature in which this thesis is situated.
- The thesis is focussing on the "who" of climate change education, at a time when climate change education as such is not yet an established part of secondary school curricula. The thesis aims to establish pathways for the removal of roadblocks and enabling climate change education to be explored extensively so it can in due course be developed into a mature professional praxis. Therefore, this thesis deliberately did not engage systematically with the development of a climate change pedagogy – the "how", or the development of a climate change curriculum – the "what". This limitation was deliberate, because this thesis did not aim to pre-empt or presuppose answers to these questions, as I argue that they are best developed by practitioners within their individual local context. In times or crises, multiple evolutionary pathways towards curriculum and pedagogy development should be trialled in parallel and in the open exchange of ideas between practitioners in order to evolve professional practice rapidly.
- The selection of the participants deliberately generated a research assemblage that excluded climate change sceptics or agnostics and teachers outside the targeted professional selection. With this exclusion, voices that might be critical toward the need or benefit of climate change education or voices from primary or middle school were not given room in this thesis.

Therefore, follow up research with a focus on these groups would be recommended (see also a brief list of recommendations for future research below).

- My positionality as an insider, participant, and researcher in this critical ethnography of climate activist teachers (CATs), and my firm ontological stance on the reality and severity of the climate change emergency, means that my voice throughout this thesis is not one of a disengaged researcher striving for an unbiased account. How can one observe the world and humanity being challenged with this existential threat without being biased toward urgent remedial action? Unbiased research on the social and educational response to climate change seems humanly impossible.

7.5 Future Directions for Research

Climate change education will grow as an essential field of study, not only regarding education in the context of schools but especially in the context of the wider population. A sizeable segment of the population remains in denial about the causes and implications of climate change. These voices, primarily associated with the political right, are threatening the democratic consensus building for effective climate change mitigation and adaptation and, thereby, also the political will to enact meaningful climate change education policies. At the same time, indigenous voices are finding common ground with the climate change movement with productive opportunities for political and spiritual resonances.

For future research, the following directions are suggested.

- Research of the nature of climate change denial and agnosticism in Aotearoa and ways to find common ground for climate action with people in this group.
- Research with communities in the 'hostile territories' identified in this research into how these communities could be won over to join the struggle for a sustainable future.
- Research with agnostics or deniers within the teaching community on similar lines as this research to find out what motivates these teachers to remain agnostic to, or in denial about, climate change, its consequences, and the need to include it in education.
- Research with school leaders about climate change education and the motivations for their engagement or disengagement in climate change education.
- Research with indigenous communities about their aspirations for the education of their children with respect to climate change.

These are just some of the directions of future research that suggest themselves based on this research.

7.6 Final Words

Human-induced climate change is the most acute symptom of the Anthropocene. Together with species extinctions, ecological collapse, and concerns over fresh water, soil fertility, and mineral resources, humanity faces a confluence of existential crises in the 21st century. It is difficult to conceive that technological advancements alone could drive society's transformation toward a sustainable future. Ultimately, humanity must learn to live sustainably within the ecological boundaries of our planet. Achieving this is, without question, an unprecedented educational challenge. As David Cole (2022) said, understanding and managing the deterritorialising machinations of the Anthropocene regarding desire, climate change, and learning is a necessary step toward the future. At all levels, the education system in Aotearoa must embrace the obligation to engage with this work and act accordingly. It will take the courage of political leadership to steer our democracy away from the right-wing populist culture wars in other parts of the Western world and lead this country on a path of scientific literacy, empathy, wisdom, cultural responsiveness, and social and inter-generational justice, in which education can thrive, and a healing of our strained relationship with the more-than-human world can progress. In such a space, we could start “walking backwards to climate calm”, as was suggested by Professor Tracey Bunda (Bunda, n.d.) of Ngugi/Wakka-Wakka heritage during her presentation at the 2022 Australian Association for Environmental Education (AAEE) research symposium. The Aboriginal Australian view of walking backwards with a view of the past that Bunda called upon may guide us into a post-humanist future where the Cartesian division of man and nature, spirit and body that unleashed the exponential growth of unsustainable practices is finally undone. In Aotearoa, a rich opportunity arises to engage in this dialogue with the indigenous population. But from all theorising and learning, material action must eventually follow suit. As MacLure (2017) reminded us, “discourse does not discipline matter” (p. 7), but only what we do on a daily basis with our hands and feet can affect the flows of matter and thereby the fate of life on our planet.

REFERENCES

350.org. (n.d.). *350.org*. Retrieved January 4, 2023, from https://350.org

ACT Party. (2023a). A Climate Response that Doesn't Cost the Earth. *ACT New Zealand*. https://www.act.org.nz/climate

ACT Party. (2023b). ACT proposes referendum on co-governance. *ACT New Zealand*. https://www.act.org.nz/act_proposes_referendum_on_co_governance

ACT Party. (2023c). Real Choice in Education. *ACT New Zealand*. https://www.act.org.nz/real-choice-education

Adam, R., Whitehouse, H., Stevenson, R. B., & Chigeza, P. (2019). The Socioecological (Un)learner: Unlearning Binary Oppositions and the Wicked Problems of the Anthropocene. In A. Cutter-Mackenzie-Knowles, A. Lasczik, J. Wilks, M. Logan, A. Turner, & W. Boyd (Eds.), *Touchstones for Deterritorializing Socioecological Learning: The Anthropocene, Posthumanism and Common Worlds As Creative Milieux* (pp. 49–74). Springer International Publishing AG. https://doi.org/10.1007/978-3-030-12212-6

Afzaal, A. (2023). *Teaching at Twilight: The Meaning of Education in the Age of Collapse*. Cascade Books, an imprint of Wipf and Stock Publishers.

Agius, C., Rosamond, A. B., & Kinnvall, C. (2020). Populism, Ontological Insecurity and Gendered Nationalism: Masculinity, Climate Denial and Covid-19. *Politics, Religion & Ideology*, *21*(4), 432–450. https://doi.org/10.1080/21567689.2020.1851871

Aitken, C., Chapman, R., & McClure, J. (2011). Climate change, powerlessness and the commons dilemma: Assessing New Zealanders' preparedness to act. *Global Environmental Change*, *21*(2), 752–760. https://doi.org/10.1016/j.gloenvcha.2011.01.002

Alexander, G. K., & Grannum, D. R. (2022). School Garden Benefits: Health Promotion and Environmental Conservation. *NASN School Nurse*, *37*(2), 79–82. https://doi.org/10.1177/1942602X211058783

Altvater, E. (2007). The Social and Natural Environment of Fossil Capitalism. *Socialist Register*, *43*. https://socialistregister.com/index.php/srv/article/view/5857

Amsler, S. (2019). Gesturing towards radical futurity in education for alternative futures. *Sustainability Science*, *14*(4), 925–930. https://doi.org/10.1007/s11625-019-00679-8

Amsler, S., Kerr, J., & Andreotti, V. (2020). Interculturality in teacher education in times of unprecedented global challenges. *Education and Society*, *38*(1), 13–37. https://doi.org/10.7459/es/38.1.02

Anderson, G. L. (1989). Critical Ethnography in Education: Origins, Current Status, and New Directions. *Review of Educational Research*, *59*(3), 249–270. https://doi.org/10.3102/00346543059003249

Ansell-Pearson, K. (2017). Deleuze and New Materialism: Naturalism, Norms, and Ethics. In S. Ellenzweig & J. H. Zammito (Eds.), *The New Politics of Materialism: History, Philosophy, Science.* (pp. 88–108). Routledge, Taylor & Francis Group. https://doi.org/10.4324/9781315268477

Archibald, M. M., Ambagtsheer, R. C., Casey, M. G., & Lawless, M. (2019). Using Zoom Videoconferencing for Qualitative Data Collection: Perceptions and Experiences of Researchers and Participants. *International Journal of Qualitative Methods*, *18*. https://doi.org/10.1177/1609406919874596

Arnold, S. T., & Elias, D. S. (2023). *Report of the Expert Working Group on Managed Retreat:* Expert Working Group on Managed Retreat. https://www.environment.govt.nz/assets/publications/climate-change/Report-of-the-Expert-Working-Group-on-Managed-Retreat-updated-25-08-2023.pdf

Arrhenius, S. (1896). On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground. *Philosophical Magazine and Journal of Science*, *41*, 237–276. https://doi.org/10.1080/14786449608620846

Atmanspacher, H. (1997). Cartesian cut, Heisenberg cut, and the concept of complexity. *World Futures*, *49*(3–4), 333–355. https://doi.org/10.1080/02604027.1997.9972639

Bacigalupi, J. A. (2022). Semiogenesis: A Dynamic System Approach to Agency and Structure. *Biosemiotics*, *15*(2), 261–284. https://doi.org/10.1007/s12304-022-09494-8

Baker, S., & Quinn, M. J. (2022). Populism, Austerity and Governance for Sustainable Development in Troubled Times: Introduction to Special Issue. *Sustainability*, *14*(6), Article 6. https://doi.org/10.3390/su14063271

Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press.

Barad, K. (2014). Diffracting Diffraction: Cutting Together-Apart. *Parallax*, *20*(3), 168–187. https://doi.org/10.1080/13534645.2014.927623

Baron, N. S., & Mangen, A. (2021). Doing the Reading: The Decline of Long Long-Form Reading in Higher Education. *Poetics Today*, *42*(2), 253–279. https://doi.org/10.1215/03335372-8883248

Bauhardt, C. (2014). Solutions to the crisis? The Green New Deal, Degrowth, and the Solidarity Economy: Alternatives to the capitalist growth economy from an ecofeminist economics perspective. *Ecological Economics*, *102*, 60–68. https://doi.org/10.1016/j.ecolecon.2014.03.015

Bazzul, J., & Kayumova, S. (2016). Toward a Social Ontology for Science Education: Introducing Deleuze and Guattari's assemblages. *Educational Philosophy and Theory*, *48*(3), 284–299. https://doi.org/10.1080/00131857.2015.1013016

Bell, R., Kawharu, M., & Taylor, K. (2017). *The Treaty on the Ground: Where we are headed, and why it matters*. Massey University Press.

Benade, L. (2011). Shaping the Responsible, Successful and Contributing Citizen of the Future: 'Values' in the New Zealand Curriculum and its Challenge to the Development of Ethical Teacher Professionality. *Policy Futures in Education*, *9*(2), 151–162. https://doi.org/10.2304/pfie.2011.9.2.151

Bencze, L., & Alsop, S. (Eds.). (2014). *Activist Science and Technology Education* (1st ed. 2014..). Springer Netherlands. https://doi.org/10.1007/978-94-007-4360-1

Bengtsson, S. (2014). Faraway, so close! Proximity and distance in ethnography online. *Media, Culture & Society*, *36*(6), 862–877. https://doi.org/10.1177/0163443714531195

Bennett, J. (2010). A Vitalist Stopover on the Way to a New Materialism. In D. Coole & S. Frost (Eds.), *New materialisms: Ontology, agency, and politics* (pp. 47–69). Duke University Press. https://doi.org/10.1515/9780822392996

Bhusal, M. K. (2020). The World After COVID-19: An Opportunity For a New Beginning. *International Journal of Scientific and Research Publications*, *10*(5), 735–741.

Bignall, S., & Patton, P. (Eds.). (2010). *Deleuze and the postcolonial*. University Press.

Birch, R. (2020). Intra-Active 'World-Making': Hope, Education, Utopias and Potential Eco-Socially Just Futures. *The Plymouth Institute of Education Online Journal*. http://hdl.handle.net/10026.1/16087

Blades, D., & Newbury, J. (2014). Learning to Let Go of Sustainability. In L. Bencze & S. Alsop (Eds.), *Activist Science and Technology Education* (1st ed. 2014.., pp. 183–202). Springer Netherlands. https://doi.org/10.1007/978-94-007-4360-1

Blenkinsop, S., Morse, M., & Datura, M. D. D. (2017). Freedom & Flourishing in a Posthumanist Age: More-Than-Human Being in Revolt. *Philosophy of Education*, *73*, 585–597. https://www.philofed.org/_files/ugd/803b74_3a654df661f84dafbf3037f35c71c79c.pdf

Bogue, R. (2004). Apology for nomadology. *Interventions*, *6*(2), 169–179. https://doi.org/10.1080/1369801042000238319

Bolstad, R. (2020). *Opportunities for education in a changing climate: Themes from key informant interviews*. New Zealand Council for Educational Research. https://doi.org/10.18296/rep.0006

Bolstad, R., & Overbye, S. (2022). Climate justice: What is it and why does it matter? *NCER*, *Research Briefing 5*, 5.

Bomberg, E. (2021). The environmental legacy of President Trump. *Policy Studies*, *42*(5–6), 628–645. https://doi.org/10.1080/01442872.2021.1922660

Bortolan, A. (2020). Overcoming the Gaze. In A. Daly, F. Cummins, J. Jardine, & D. Moran (Eds.), *Perception and the Inhuman Gaze: Perspectives from Philosophy, Phenomenology, and the Sciences*. Routledge.

Boulianne, S., Lalancette, M., & Ilkiw, D. (2020). "School Strike 4 Climate": Social Media and the International Youth Protest on Climate Change. *Media and Communication*, *8*(2), Article 2. https://doi.org/10.17645/mac.v8i2.2768

Boyd, C., Parr, H., & Philo, C. (2023). Climate anxiety as posthuman knowledge. *Wellbeing, Space and Society*, *4*, 100120. https://doi.org/10.1016/j.wss.2022.100120

Boyle, J. (2011). The Second Enclosure Movement and the Construction of the Public Domain. In *Copyright Law*. Routledge.

Braidotti, R. (2006). Posthuman, All Too Human: Towards a New Process Ontology. *Theory, Culture & Society*, *23*(7–8), 197–208. https://doi.org/10.1177/0263276406069232

Braidotti, R. (2012). *Nomadic Theory: The Portable Rosi Braidotti*. Columbia University Press.

Braidotti, R. (2013). Nomadic Ethics. *Deleuze Studies*, *7*(3), 342–359. https://doi.org/10.3366/dls.2013.0116

Braidotti, R. (2019a). A Theoretical Framework for the Critical Posthumanities. *Theory, Culture & Society*, *36*(6), 31–61. https://doi.org/10.1177/0263276418771486

Braidotti, R. (2019b). Affirmative Ethics and Generative Life. *Deleuze and Guattari Studies*, *13*(4), 463–481. https://doi.org/10.3366/dlgs.2019.0373

Braidotti, R. (2019c). *Posthuman Knowledge.* Newark: Polity Press.

Braidotti, R. (2019d). Transversal Posthumanities. *Philosophy Today*, *63*(4), 1181–1195. https://doi.org/10.5840/philtoday2020128318

Braidotti, R. (2020). What Counts as Human/Inhuman Right Now? In A. Daly, F. Cummins, J. Jardine, & D. Moran (Eds.), *Perception and the Inhuman Gaze: Perspectives from Philosophy, Phenomenology, and the Sciences*. Routledge.

Brassier, R. (2007). *Nihil Unbound: Enlightenment and Extinction*. Palgrave Macmillan UK. https://doi.org/10.1057/9780230590823

Brewer II, J. P., & Warner, E. A. K. (2014). Protecting Indigenous Knowledge in the Age of Climate Change. *Georgetown International Environmental Law Review*, *27*(4), 585–628. https://heinonline.org/HOL/P?h=hein.journals/gintenlr27&i=596

Briassoulis, H. (2019). Governance as multiplicity: The Assemblage Thinking perspective. *Policy Sciences*, *52*(3), 419–450. https://doi.org/10.1007/s11077-018-09345-9

Brickell, A. (2019). Environmental grooming. *The Mercury Bay Informer*. https://www.theinformer.co.nz/issues/2019/259-01-may-2019/file

Bright, R. (2023). *Climate strike experiences: Youth voice informing secondary schooling in Aotearoa New Zealand* [Thesis, The University of Waikato]. https://researchcommons.waikato.ac.nz/handle/10289/15592

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

Bright, R., & Eames, C. (2022). From apathy through anxiety to action: Emotions as motivators for youth climate strike leaders. *Australian Journal of Environmental Education*, *38*(1), 13–25. https://doi.org/10.1017/aee.2021.22

Bromhead, H. (2021). Disaster linguistics, climate change semantics and public discourse studies: A semantically-enhanced discourse study of 2011 Queensland Floods. *Language Sciences*, *85*, 101381. https://doi.org/10.1016/j.langsci.2021.101381

Bromhead, H., & Goddard, C. (2023). *Applied semantics and climate communication*. https://doi.org/10.1075/aral.22028.bro

Brooks, S. K., & Greenberg, N. (2023). Climate change effects on mental health: Are there workplace implications? *Occupational Medicine*, *73*(3), 133–137. https://doi.org/10.1093/occmed/kqac100

Brown, G. (2009). The Ontological Turn in Education. *Journal of Critical Realism*, *8*(1), 5–34. https://doi.org/10.1558/jocr.v8i1.5

Brulle, R. J., & Norgaard, K. M. (2019). Avoiding cultural trauma: Climate change and social inertia. *Environmental Politics*, *28*(5), 886–908. https://doi.org/10.1080/09644016.2018.1562138

Bunda, T. (n.d.). *Professor Tracey Bunda* [University of Queensland]. Retrieved June 24, 2023, from https://hass.uq.edu.au/profile/8520/tracey-bunda

Calder, G. (2011). Climate change and normativity: Constructivism versus realism. *Critical Review of International Social and Political Philosophy*, *14*(2), 153–169. https://doi.org/10.1080/13698230.2011.529706

Callus, I. (2012). Reclusiveness and posthumanist subjectivity. *Subjectivity*, *5*(3), 290–311. https://doi.org/10.1057/sub.2012.12

Caron, D. (2009). *It's A Vuca World!* https://www.slideshare.net/dcaron/its-a-vuca-world-cips-cio-march-5-2009-draft

Carpiano, R. M., Callaghan, T., DiResta, R., Brewer, N. T., Clinton, C., Galvani, A. P., Lakshmanan, R., Parmet, W. E., Omer, S. B., Buttenheim, A. M., Benjamin, R. M., Caplan, A., Elharake, J. A., Flowers, L. C., Maldonado, Y. A., Mello, M. M., Opel, D. J., Salmon, D. A., Schwartz, J. L., … Hotez, P. J. (2023). Confronting the evolution and expansion of anti-vaccine activism in the USA in the COVID-19 era. *The Lancet*, *401*(10380), 967–970. https://doi.org/10.1016/S0140-6736(23)00136-8

Carter, L. (2019a). *Indigenous Pacific Approaches to Climate Change: Aotearoa/New Zealand*. Springer International Publishing. https://doi.org/10.1007/978-3-319-96439-3

Carter, L. (2019b). Traditional Ecological Knowledge in Climate Change. In L. Carter (Ed.), *Indigenous Pacific Approaches to Climate Change: Aotearoa/New Zealand* (pp. 25–38). Springer International Publishing. https://doi.org/10.1007/978-3-319-96439-3_3

Carvell, S., & Ritchie, J. (2020). *Climate Change Learning Programme*. NZAEE. https://www.nzaee.org.nz/resources/climate-change-learning-programme

Ceballos, G., Ehrlich, P. R., & Raven, P. H. (2020). Vertebrates on the brink as indicators of biological annihilation and the sixth mass extinction. *Proceedings of the National Academy of Sciences*, *117*(24), 13596–13602. https://doi.org/10.1073/pnas.1922686117

CFR. (2023). *The Weather of Summer 2023 Was the Most Extreme Yet*. Council on Foreign Relations. https://www.cfr.org/article/weather-summer-2023-was-most-extreme-yet

Chawla, L. (2020). Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss. *People and Nature*, *2*(3), 619–642. https://doi.org/10.1002/pan3.10128

Cheah, P. (2010). Non-Dialectical Materialism. In D. Coole & S. Frost (Eds.), *New materialisms: Ontology, agency, and politics* (pp. 70–91). Duke University Press. https://doi.org/10.1515/9780822392996

Clark, B., & York, R. (2005). Carbon metabolism: Global capitalism, climate change, and the biospheric rift. *Theory and Society*, *34*(4), 391–428. https://doi.org/10.1007/s11186-005-1993-4

Clayton, P., & Davies, P. (2006). *The Re-Emergence of Emergence: The Emergentist Hypothesis from Science to Religion*. Oxford University Press.

Clayton, S. (2020). Climate anxiety: Psychological responses to climate change. *Journal of Anxiety Disorders*, *74*, 102263. https://doi.org/10.1016/j.janxdis.2020.102263

Climate Change Commission. (n.d.). *Advice to Government*. Retrieved October 8, 2023, from https://www.climatecommission.govt.nz/

Climate Change Commission. (2021). *2021 Draft Advice for Consultation* [Draft Report]. https://ccc-production-media.s3.ap-southeast-2.amazonaws.com/public/evidence/advice-report-DRAFT-1ST-FEB/ADVICE/CCC-ADVICE-TO-GOVT-31-JAN-2021-pdf.pdf

Climate Change Response (Zero Carbon) Amendment Act (2019). https://www.legislation.govt.nz/act/public/2019/0061/latest/LMS183736.html

Codd, J. (2005). Teachers as 'managed professionals' in the global education industry: The New Zealand experience. *Educational Review*, *57*(2), 193–206. https://doi.org/10.1080/0013191042000308369

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education. Milton Park, Abingdon, Oxon,[England]*. Routledge.

Cole, D. R. (2011). *Educational life-forms: Deleuzian teaching and learning practice*. Sense Publishers.

Cole, D. R. (2014). Inter-collapse … Educational Nomadology for a Future Generation. In M. Carlin & J. Wallin (Eds.), *Deleuze & Guattari, politics and education: For a people-yet-to-come* (pp. 49–75). Bloomsbury.

Cole, D. R. (2021). *Education, the Anthropocene, and Deleuze/Guattari*. BRILL.

Cole, D. R. (2022). Anti-Oedipus in the Anthropocene: Education and the deterritorializing machine. *Educational Philosophy and Theory*, 1–13. https://doi.org/10.1080/00131857.2022.2129006

Colebrook, C. (2020a). The Future is Already Deterritorialized. In R. Harrison & C. Sterling (Eds.), *Deterritorializing the Future: Heritage in, of and after the Anthropocene* (pp. 346–383). Open Humanities Press. https://library.oapen.org/handle/20.500.12657/41204

Colebrook, C. (2020b). *Understanding Deleuze*. Routledge, Taylor & Francis Group. https://doi.org/10.4324/9781003118312

Coleman, R., & Ringrose, J. (Eds.). (2013). *Deleuze and research methodologies*. University Press. https://doi.org/10.1515/9780748644124

Collins, W. J., Webber, C. P., Cox, P. M., Huntingford, C., Lowe, J., Sitch, S., Chadburn, S. E., Comyn-Platt, E., Harper, A. B., Hayman, G., & Powell, T. (2018). Increased importance of methane reduction for a 1.5 degree target. *Environmental Research Letters*, *13*(5), 054003. https://doi.org/10.1088/1748-9326/aab89c

Colliver, A. (2017). Education for climate change and a real-world curriculum. *Curriculum Perspectives*, *37*(1), 73–78. https://doi.org/10.1007/s41297-017-0012-z

Cook, A. (2022). As it happened: Farmers take to streets in nationwide Groundswell protest. *Newshub*. https://www.newshub.co.nz/home/new-zealand/2022/10/live-updates-farmers-take-to-streets-in-nationwide-groundswell-protest.html

Coole, D. (2010). The Inertia of Matter and the Generativity of Flesh. In D. Coole & S. Frost (Eds.), *New materialisms: Ontology, agency, and politics* (pp. 92–115). Duke University Press. https://doi.org/10.1515/9780822392996

Coole, D., & Frost, S. (Eds.). (2010). *New Materialisms: Ontology, Agency, and Politics*. Duke University Press. https://doi.org/10.1515/9780822392996

Cooper, D. H., & Nagel, J. (2021). Lessons from the pandemic: Climate change and COVID-19. *International Journal of Sociology and Social Policy*, *42*(3/4), 332–347. https://doi.org/10.1108/IJSSP-07-2020-0360

Cooper, M. H., & Rosin, C. (2014). Absolving the sins of emission: The politics of regulating agricultural greenhouse gas emissions in New Zealand. *Journal of Rural Studies*, *36*, 391–400. https://doi.org/10.1016/j.jrurstud.2014.06.008

Corkery, L. (2004). Community gardens as a platform for education for sustainability. *Australian Journal of Environmental Education*, *20*(1), 69–75. https://doi.org/10.1017/S0814062600002317

Corlett, E. (2022, November 12). Nineteen years after the 'fart tax', New Zealand's farmers are fighting emissions. *The Guardian*. https://www.theguardian.com/world/2022/nov/12/19-years-after-the-fart-tax-new-zealands-farmers-are-fighting-emissions

Cowie, R. H., Bouchet, P., & Fontaine, B. (2022). The Sixth Mass Extinction: Fact, fiction or speculation? *Biological Reviews*, *97*(2), 640–663. https://doi.org/10.1111/brv.12816

Cram, F., Pipi, K., & Paipa, K. (2018). Kaupapa Māori Evaluation in Aotearoa New Zealand. *New Directions for Evaluation*, *2018*(159), 63–77. https://doi.org/10.1002/ev.20331

Cranton, P., & Carusetta, E. (2004). Perspectives on Authenticity in Teaching. *Adult Education Quarterly*, *55*(1), 5–22. https://doi.org/10.1177/0741713604268894

Crill, P. M., & Thornton, B. F. (2017). Whither methane in the IPCC process? *Nature Climate Change*, *7*(10), Article 10. https://doi.org/10.1038/nclimate3403

Cross, I. D., & Congreve, A. (2021). Teaching (super) wicked problems: Authentic learning about climate change. *Journal of Geography in Higher Education*, *45*(4), 491–516. https://doi.org/10.1080/03098265.2020.1849066

Crutzen, P. J. (2010). Anthropocene man. *Nature*, *467*(7317), Article 7317. https://doi.org/10.1038/467S10a

Crutzen, P. J., & Steffen, W. (2003). How Long Have We Been in the Anthropocene Era? *Climatic Change*, *61*(3), 251–257. https://doi.org/10.1023/B:CLIM.0000004708.74871.62

Cunningham, M. (2022). *Mobilising the Masses: Populist Conservative Movements in Australia and New Zealand During the Great Depression*. ANU Press. https://doi.org/10.22459/MM.2022

Cuthers, W. K. (2018). Reclaiming Identity. *Te Kaharoa*, *11*(1), Article 1. https://doi.org/10.24135/tekaharoa.v11i1.219

Cutter-Mackenzie-Knowles, A., Lasczik, A., Wilks, J., Logan, M., Turner, A., & Boyd, W. (Eds.). (2019). *Touchstones for Deterritorializing Socioecological Learning: The Anthropocene, Posthumanism and Common Worlds As Creative Milieux*. Springer International Publishing AG. https://doi.org/10.1007/978-3-030-12212-6

Daigle, C., & McDonald, T. H. (Eds.). (2022). *From Deleuze and Guattari to posthumanism: Philosophies of immanence*. Bloomsbury Academic.

D'Alisa, G., & Kallis, G. (2020). Degrowth and the State. *Ecological Economics*, *169*, 106486. https://doi.org/10.1016/j.ecolecon.2019.106486

Daly, A., Cummins, F., Jardine, J., & Moran, D. (Eds.). (2020). *Perception and the inhuman gaze: Perspectives from philosophy, phenomenology, and the sciences*. Routledge.

Deakin, H., & Wakefield, K. (2014). Skype interviewing: Reflections of two PhD researchers. *Qualitative Research*, *14*(5), 603–616. https://doi.org/10.1177/1468794113488126

DeLanda, M. (Director). (2011). *Assemblage Theory, Society, and Deleuze. 2011*. https://www.youtube.com/watch?v=J-I5e7ixw78&t=2581s

DeLanda, M. (2013). *Intensive science and virtual philosophy*. Bloomsbury Publishing.

DeLanda, M. (2016). *Assemblage theory*. Edinburgh University Press.

DeLanda, M., Protevi, J., & Thanem, T. (2005). Deleuzian Interrogations: A Conversation with Manuel DeLanda and John Protevi. *Tamara: Journal of Critical Postmodern Organization Science*, *3*(4).

Deleuze, G. (1994). *Difference and repetition*. Columbia University Press.

Deleuze, G. (1997). Immanence: A Life... *Theory, Culture & Society*, *14*(2), 3–7. https://doi.org/10.1177/026327697014002002

Deleuze, G. (2002). DESCRIPTION OF WOMAN: For a philosophy of the sexed other [1]. *Angelaki*, *7*(3), 17–24. https://doi.org/10.1080/0969725022000032454

Deleuze, G. (2005). *Francis Bacon* (First edition). University of Minnesota Press.

Deleuze, G., & Guattari, F. (1983). *Anti-Oedipus: Capitalism and schizophrenia*. University of Minnesota Press.

Deleuze, G., & Guattari, F. (1987). *A thousand plateaus: Capitalism and schizophrenia* (B. Massumi, Trans.). University of Minnesota Press.

Demeritt, D. (2006). Science studies, climate change and the prospects for constructivist critique. *Economy and Society*, *35*(3), 453–479. https://doi.org/10.1080/03085140600845024

Demos, T. J. (2020). *Beyond the World's End: Arts of Living at the Crossing* (1st ed.). Duke University Press. https://doi.org/10.1515/9781478012252

Dodds, J. (2011). *Psychoanalysis and Ecology at the Edge of Chaos: Complexity Theory, Deleuze,Guattari and Psychoanalysis for a Climate in Crisis*. Routledge. https://doi.org/10.4324/9780203157664

Dolphijn, R., & Tuin, I. van der. (2012). *New materialism: Interviews & cartographies*. Open Humanities Press.

Dotson, K. (2011). Tracking epistemic violence, tracking practices of silencing. *Hypatia*, *26*(2), 236–257. https://doi.org/10.1111/j.1527-2001.2011.01177.x

Drewes, A. (2020). *Personal, professional, political: An exploration of science teacher identity development for teaching climate change* [PhD Thesis, University of Delaware]. https://doi.org/10.1080/13504622.2020.1737647

Duke, J. R., & Holt, E. A. (2022). Seeing climate change: Psychological distance and connection to nature. *Environmental Education Research*, 1–21. https://doi.org/10.1080/13504622.2022.2042205

Dukes, J. S. (2003). Burning Buried Sunshine: Human Consumption of Ancient Solar Energy. *Climatic Change*, *61*(1), 31–44. https://doi.org/10.1023/A:1026391317686

Easton, B. (2014). Economic Inequality in New Zealand: Update to a User's Guide. *New Zealand Sociology*, *29*(3), 7–23. https://www.proquest.com/docview/1648847912/abstract/7C730423C3BB4DECPQ/1

Egan, M. (2022). *Equity, inclusivity and shared humanity: Addressing intergenerational failure of schooling for Māori* [Thesis, The University of Waikato]. https://researchcommons.waikato.ac.nz/handle/10289/15290

Eilam, E. (2022). Climate change education: The problem with walking away from disciplines. *Studies in Science Education*, *58*(2), 1–34. https://doi.org/10.1080/03057267.2021.2011589

Eketone, A., & Walker, S. (2016). Kaupapa Māori Social Work Research. In M. Grey, J. Coates, Mi. Y. Bird, & T. Hetherington (Eds.), *Decolonizing Social Work*. Routledge. https://doi.org/10.4324/9781315576206

El-Hani, C. N., & Pihlström, S. (2002). Emergence Theories and Pragmatic Realism. *Essays in Philosophy*, *3*(2), 143–176. https://doi.org/10.5840/eip2002325

Ellenzweig, S., & Zammito, J. H. (Eds.). (2017). *The New Politics of Materialism: History, Philosophy, Science.* (pp. 1–328). Routledge, Taylor & Francis Group. https://doi.org/10.4324/9781315268477

Elshof, L. (2014). Passive No More. In L. Bencze & S. Alsop (Eds.), *Activist Science and Technology Education* (1st ed. 2014.., pp. 323–342). Springer Netherlands. https://doi.org/10.1007/978-94-007-4360-1

EPI. (n.d.). *Greenhouse gas emissions per capita | Environmental Performance Index*. Retrieved September 17, 2023, from https://epi.yale.edu/epi-results/2022/component/ghp

Erikson, E. H. (1968). *Identity: Youth and crisis*. Faber & Faber.

Etminan, M., Myhre, G., Highwood, E. J., & Shine, K. P. (2016). Radiative forcing of carbon dioxide, methane, and nitrous oxide: A significant revision of the methane radiative forcing. *Geophysical Research Letters*, *43*(24), 12,614-12,623. https://doi.org/10.1002/2016GL071930

Evers, J., & Kneyber, R. (2015). *Flip the System: Changing Education from the Ground Up.* (pp. 1–306). London: Taylor & Francis Group. https://doi.org/10.4324/9781315678573

Everth, T. (2021). *Connecting Statistics with Earth and Space Science*. https://youtu.be/WcVAp3caNeo

Everth, T. (2022a). On Snakes and Ladders. *Waikato Journal of Education*, *27*(2), 11–17. https://doi.org/10.15663/wje.v27i2.919

Everth, T. (2022b). Stop tinkering around the edges: A call for the deterritorialisation of assessment praxis in the age of Anthropocene predicaments. *Assessment Matters*, *16*. https://doi.org/10.18296/am.0057

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. (2021). 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., & Gurney, L. (2022). Emergent Realities: Diffracting Barad within a quantum-realist ontology of matter and politics. *European Journal for Philosophy of Science*, *12*(3), 51. https://doi.org/10.1007/s13194-022-00476-8

Everth, T., Gurney, L., & Eames, C. (2022). Assemblage drawings as talking points: Deleuze, posthumans and climate-activist teachers. *Australian Journal of Environmental Education*, 1–14. https://doi.org/10.1017/aee.2022.48

Extinction Rebellion. (n.d.). *Extinction Rebellion*. Retrieved January 4, 2023, from https://rebellion.global/

Falkenberg, M., Galeazzi, A., Torricelli, M., Di Marco, N., Larosa, F., Sas, M., Mekacher, A., Pearce, W., Zollo, F., Quattrociocchi, W., & Baronchelli, A. (2022). Growing polarization around climate change on social media. *Nature Climate Change*, *12*(12), Article 12. https://doi.org/10.1038/s41558-022-01527-x

Farrell, C., Green, A., Knights, S., & Skeaping, W. (Eds.). (2019). *This is not a drill: An extinction rebellion handbook*. Penguin Books.

Farrell, J. (2016). Corporate funding and ideological polarization about climate change. *Proceedings of the National Academy of Sciences*, *113*(1), 92–97. https://doi.org/10.1073/pnas.1509433112

Feely, M. (2019). Assemblage analysis: An experimental new-materialist method for analysing narrative data. *Qualitative Research*, 1468794119830641. https://doi.org/10.1177/1468794119830641

Festinger, L. (1957). *A theory of cognitive dissonance* (Vol. 2). Stanford university press.

Fine, G. A., & Abramson, C. M. (2020). Ethnography in the Time of COVID-19: Vectors and the Vulnerable. *Etnografia e Ricerca Qualitativa*, *13*(2), 165–174. https://doi.org/DOI: 10.3240/97802

Fiorino, D. J. (2018). *Can democracy handle climate change?* John Wiley & Sons.

Fiorino, D. J. (2022). Climate change and right-wing populism in the United States. *Environmental Politics*, *31*(5), 801–819. https://doi.org/10.1080/09644016.2021.2018854

Fish, W. (2016). "Post-Truth" Politics and Illusory Democracy. *Psychotherapy and Politics International*, *14*(3), 211–213. https://doi.org/10.1002/ppi.1387

Fitzpatrick, K., & May, S. (2022). *Critical Ethnography and Education: Theory, Methodology, and Ethics*. Taylor and Francis. https://doi.org/10.4324/9781315208510

Fontana, A., & Prokos, A. H. (2007). *The interview: From formal to postmodern*. Left Coast Press. https://doi.org/10.4324/9781315418131

Foran, J., Gray, S., Grosse, C., & Lequesne, T. (2018). This Will Change Everything: Teaching the Climate Crisis. *Transformations: The Journal of Inclusive Scholarship & Pedagogy*, *28*(2), 126–147. https://doi.org/10.1353/tnf.2018.0017

Forchtner, B., & Lubarda, B. (2023). Scepticisms and beyond? A comprehensive portrait of climate change communication by the far right in the European Parliament. *Environmental Politics*, *32*(1), 43–68. https://doi.org/10.1080/09644016.2022.2048556

Ford, D. (2018). *Politics and pedagogy in the "post-truth" era: Insurgent philosophy and praxis*. Bloomsbury Publishing. http://dx.doi.org/10.5040/9781350059931

Fortunato, P., & Panizza, U. (2015). Democracy, education and the quality of government. *Journal of Economic Growth*, *20*(4), 333–363. https://doi.org/10.1007/s10887-015-9120-5

Foucault, M. (2007). *Security, territory, population: Lectures at the Collège de France, 1977-78*. Palgrave Macmillan.

Fox, N. J. (2022). Coronavirus, capitalism and a 'thousand tiny dis/advantages': A more-than-human analysis. *Social Theory & Health*. https://doi.org/10.1057/s41285-022-00179-3

Fox, N. J., & Alldred, P. (2015a). Inside the research-assemblage: New materialism and the micropolitics of social inquiry. *Sociological Research Online*, *20*(2), 1–19. https://doi.org/10.5153/sro.3578

Fox, N. J., & Alldred, P. (2015b). New materialist social inquiry: Designs, methods and the research-assemblage. *International Journal of Social Research Methodology*, *18*(4), 399–414. https://doi.org/10.1080/13645579.2014.921458

Fox, N. J., & Alldred, P. (2016). *Sociology and the New Materialism: Theory, Research, Action*. SAGE Publications, Sage Publications.

Fox, N. J., & Alldred, P. (2020a). Economics, the climate change policy-assemblage and the new materialisms: Towards a comprehensive policy. *Globalizations*, *0*(0), 1–11. https://doi.org/10.1080/14747731.2020.1807857

Fox, N. J., & Alldred, P. (2020b). Re-assembling climate change policy: Materialism, posthumanism, and the policy assemblage. *The British Journal of Sociology*, *71*(2), 269–283. https://doi.org/10.1111/1468-4446.12734

Fox, N. J., & Alldred, P. (2021a). Applied Research, Diffractive Methodology, and the Research-Assemblage: Challenges and Opportunities. *Sociological Research Online*, 13607804211029978. https://doi.org/10.1177/13607804211029978

Fox, N. J., & Alldred, P. (2021b). Climate change, environmental justice and the unusual capacities of posthumans. *Journal of Human Rights and the Environment*, *12*, 59–75. https://doi.org/10.4337/jhre.2021.00.03

Fox, N. J., & Alldred, P. (2021c). Doing new materialist data analysis: A Spinozo-Deleuzian ethological toolkit. *International Journal of Social Research Methodology*, *0*(0), 1–14. https://doi.org/10.1080/13645579.2021.1933070

Frantz, C. M., & Mayer, F. S. (2009). The Emergency of Climate Change: Why Are We Failing to Take Action? *Analyses of Social Issues and Public Policy*, *9*(1), 205–222. https://doi.org/10.1111/j.1530-2415.2009.01180.x

Freire, P. (2000). *Pedagogy of the oppressed* (30th anniversary ed). Continuum.

Freire-González, J., & Puig-Ventosa, I. (2015). Energy Efficiency Policies and the Jevons Paradox. *International Journal of Energy Economics and Policy*, *5*(1), 69–79. https://dergipark.org.tr/en/pub/ijeeep/issue/31912/350865

Freychet, N., Tett, S. F. B., Yan, Z., & Li, Z. (2020). Underestimated Change of Wet-Bulb Temperatures Over East and South China. *Geophysical Research Letters*, *47*(3), e2019GL086140. https://doi.org/10.1029/2019GL086140

Fridays For Future. (n.d.). *Fridays For Future Aotearoa, Te Upoko o te Ika*. Retrieved February 3, 2023, from https://www.fridaysforfuture.nz/

Fu, X., Bell, R., White, I., & Serrao-Neumann, S. (2023). Flood protection based on historical records is flawed – we need a risk model fit for climate change. *The Conversation*. https://researchcommons.waikato.ac.nz/handle/10289/16023

Funtowicz, S. O., & Ravetz, J. R. (1993). Science for the post-normal age. *Futures*, *25*(7), 739–755. https://doi.org/10.1016/0016-3287(93)90022-L

Galloway-McLean, K. (2017). *Advance guard: Climate change impacts, adaptation, mitigation and indigenous peoples: a compendium of case studies*. United Nations University.

Gibson, M. D. and E. (2021, November 19). The eight key issues the Groundswell group is protesting about. *Stuff*. https://www.stuff.co.nz/national/politics/127034918/the-eight-key-issues-the-groundswell-group-is-protesting-about

Gifford, R. (2011). The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, *66*(4), 290. https://doi.org/10.1037/a0023566

Gifford, R., Lacroix, K., & Chen, A. (2018). 7 - Understanding responses to climate change: Psychological barriers to mitigation and a new theory of behavioral choice. In S. Clayton & C. Manning (Eds.), *Psychology and Climate Change* (pp. 161–183). Academic Press. https://doi.org/10.1016/B978-0-12-813130-5.00006-0

Gilbert, J. (2015). Leading in collaborative, complex education systems. In *Leadership for Communities of Learning: Five Think Pieces*. New Zealand Education Council. https://hdl.handle.net/10292/10449

Giuntoli, J., Oliver, T., Kallis, G., Ramcilovic-Suominen, S., & Monbiot, G. (2023). *Exploring new visions for a sustainable bioeconomy*. Publications Office of the European Union. https://jukuri.luke.fi/handle/10024/553309

Glaser, B. G., & Strauss, A. L. (2009). *The discovery of grounded theory: Strategies for qualitative research* (4. paperback printing). Aldine.

Glaser, M. B. (1982). *1982 Exxon Primer on CO2 Greenhouse Effect.pdf*. Exxon Mobile. https://insideclimatenews.org/sites/default/files/documents/1982%20Exxon%20Primer%20on%20CO2%20Greenhouse%20Effect.pdf

Gluckman, S. P., Bardsley, A., Spoonley, P., Royal, C., Simon-Kumar, N., & Chen, A. (2021). *Sustaining Aotearoa New Zealand as a cohesive society* (p. 25). University of Auckland, Koi Tū: Centre For Informed Futures. https://informedfutures.org/wp-content/uploads/Sustaining-Aotearoa-New-Zealand-as-a-cohesive-society.pdf

Glynn, T. (2015). *Bicultural challenges for educational professionals in Aotearoa*. *20th Anniversary Collection*, 103–113. https://doi.org/10.15663/wje.v20i3.227

Goodchild, P. (1996). *Deleuze and Guattari: An Introduction to the Politics of Desire* (1st ed.). SAGE Publications. https://doi.org/10.4135/9781446250433

Gordon, L. (1992). Educational Reform in New Zealand: Contesting the role of the teacher. *International Studies in Sociology of Education*, *2*(1), 23–42. https://doi.org/10.1080/0962021920020102

Gore, A. (2006). *An Inconvenient Truth: The Planetary Emergency of Global Warming and What We Can Do About It*. Rodale.

Goyanes, M., Borah, P., & Gil de Zúñiga, H. (2021). Social media filtering and democracy: Effects of social media news use and uncivil political discussions on social media unfriending. *Computers in Human Behavior*, *120*, 106759. https://doi.org/10.1016/j.chb.2021.106759

Grantham, J. (2012). Be persuasive. Be brave. Be arrested (if necessary). *Nature*, *491*(7424), Article 7424. https://doi.org/10.1038/491303a

Gray, L. M., Wong-Wylie, G., Rempel, G. R., & Cook, K. (2020). Expanding qualitative research interviewing strategies: Zoom video communications. *The Qualitative Report*, *25*(5), 1292–1301. https://doi.org/10.46743/2160-3715/2020.4212

Grosz, E. (2011a). *Becoming Undone*. Duke University Press. https://doi.org/10.1215/9780822394433

Grosz, E. (2011b). Matter, Life, and Other Variations. *Philosophy Today*, *55*, 17–27. https://doi.org/10.5840/philtoday201155Supplement3

Gruenewald, D. A. (2003). The Best of Both Worlds: A Critical Pedagogy of Place. *Educational Researcher*, *32*(4), 3–12. https://doi.org/10.3102/0013189X032004003

Gunderson, R., Stuart, D., & Petersen, B. (2018). Ideological obstacles to effective climate policy: The greening of markets, technology, and growth. *Capital & Class*, *42*(1), 133–160. https://doi.org/10.1177/0309816817692127

Gunningham, N. (2019). Averting Climate Catastrophe: Environmental Activism, Extinction Rebellion and coalitions of Influence. *King's Law Journal*, *30*(2), 194–202. https://doi.org/10.1080/09615768.2019.1645424

Gunster, S., Fleet, D., Paterson, M., & Saurette, P. (2018). "Why Don't You Act Like You Believe It?": Competing Visions of Climate Hypocrisy. *Frontiers in Communication*, *3*. https://www.frontiersin.org/articles/10.3389/fcomm.2018.00049

Habermas, J. (1976). *Legitimation crisis*. Heinemann.

Hammersley, M. (2018). What is ethnography? Can it survive? Should it? *Ethnography and Education*, *13*(1), 1–17. https://doi.org/10.1080/17457823.2017.1298458

Hampton, S. (2020). Rights and resurgence in Aotearoa New Zealand: A case study of the united nations declaration on the rights of indigenous peoples role in self determination. *MAI Journal: A New Zealand Journal of Indigenous Scholarship*, *9*(2), 97–110. https://doi.org/10.20507/MAIJournal.2019.9.2.1

Hanley, C. (2019). Thinking with Deleuze and Guattari: An exploration of writing as assemblage. *Educational Philosophy and Theory*, *51*(4), 413–423. https://doi.org/10.1080/00131857.2018.1472574

Hannah, K., Hattotuwa, S., & Taylor, K. (2022). The murmuration of information disorders: Aotearoa New Zealand, mis- and disinformation ecologies and the parliament protest. *Pacific Journalism Review*, *28*(1/2), 138–161. https://doi.org/10.3316/informit.592168791993172

Hansen, J. E., Sato, M., Simons, L., Nazarenko, L. S., von Schuckmann, K., Loeb, N. G., Osman, M. B., Kharecha, P., Jin, Q., Tselioudis, G., Lacis, A., Ruedy, R., Russell, G., Cao, J., & Li, J. (2022). *Global warming in the pipeline*. https://doi.org/10.48550/arXiv.2212.04474

Hansen, J., Sato, M., Hearty, P., Ruedy, R., Kelley, M., Masson-Delmotte, V., Russell, G., Tselioudis, G., Cao, J., Rignot, E., Velicogna, I., Tormey, B., Donovan, B., Kandiano, E., von Schuckmann, K., Kharecha, P., Legrande, A. N., Bauer, M., & Lo, K.-W. (2016). Ice melt, sea level rise and superstorms: Evidence from paleoclimate data, climate modeling, and modern observations that 2 °C global warming could be dangerous. *Atmospheric Chemistry and Physics*, *16*(6), 3761–3812. https://doi.org/10.5194/acp-16-3761-2016

Hansson, S. O. (2018). Dealing with climate science denialism: Experiences from confrontations with other forms of pseudoscience. *Climate Policy*, *18*(9), 1094–1102. https://doi.org/10.1080/14693062.2017.1415197

Hansson, S. O. (2020). Social constructionism and climate science denial. *European Journal for Philosophy of Science*, *10*(3), 37. https://doi.org/10.1007/s13194-020-00305-w

Haraway, D. J. (2018). *Modest_Witness@Second_Millennium. FemaleMan_Meets_OncoMouse: Feminism and technoscience* (Second edition). Routledge. https://doi.org/10.4324/9780203731093

Harmon-Jones, E., & Mills, J. (2019). An Introduction to Cognitive Dissonance Theory and an Overview of Current Perspectives on the Theory. In E. HARMON-JONES (Ed.), *Cognitive Dissonance* (2nd ed., pp. 3–24). American Psychological Association. http://www.jstor.org/stable/j.ctv1chs6tk.7

Harrington, L. J., Dean, S. M., Awatere, S., Rosier, S., Queen, L., Gibson, P. B., Barnes, C., Zachariah, M., Philip, S., & Kew, S. (2023). *The role of climate change in extreme rainfall associated with Cyclone Gabrielle over Aotearoa New Zealand's East Coast*. https://researchcommons.waikato.ac.nz/handle/10289/15945

Harris, D. C. (2010). Charles David Keeling and the Story of Atmospheric CO2 Measurements. *Analytical Chemistry*, *82*(19), 7865–7870. https://doi.org/10.1021/ac1001492

Harris, M. (2017). *The New Zealand project*. Bridget Williams Books.

Harrison, R., & Sterling, C. (Eds.). (2020). *Deterritorializing the Future: Heritage in, of and after the Anthropocene*. Open Humanities Press. https://library.oapen.org/handle/20.500.12657/41204

Hart, P. S., & Nisbet, E. C. (2011). Boomerang Effects in Science Communication: How Motivated Reasoning and Identity Cues Amplify Opinion Polarization About Climate Mitigation Policies. *Communication Research*. https://doi.org/10.1177/0093650211416646

Hatzisavvidou, S. (2021). 'The climate has always been changing': Sarah Palin, climate change denialism, and American conservatism. *Celebrity Studies*, *12*(3), 371–388. https://doi.org/10.1080/19392397.2019.1667251

Hausfather, Z. (2023, October 13). Opinion | I Study Climate Change. The Data Is Telling Us Something New. *The New York Times*. https://www.nytimes.com/2023/10/13/opinion/climate-change-excessive-heat-2023.html

Heeren, A., Mouguiama-Daouda, C., & Contreras, A. (2022). On climate anxiety and the threat it may pose to daily life functioning and adaptation: A study among European and African French-speaking participants. *Climatic Change*, *173*(1), 15. https://doi.org/10.1007/s10584-022-03402-2

Hein, S. F. (2016). The New Materialism in Qualitative Inquiry: How Compatible Are the Philosophies of Barad and Deleuze? *Cultural Studies ↔ Critical Methodologies*, *16*(2), 132–140. https://doi.org/10.1177/1532708616634732

Hemminki-Reijonen, U., & Logadottir, H. (2021). Reinventing Climate Change Education. *The Arctic Initiative Papers*. https://dash.harvard.edu/handle/1/37373238

Henriksen, D., Creely, E., & Mehta, R. (2021). Rethinking the Politics of Creativity: Posthumanism, Indigeneity, and Creativity Beyond the Western Anthropocene. *Qualitative Inquiry*, 10778004211065813. https://doi.org/10.1177/10778004211065813

Herod, A. (1999). Reflections on interviewing foreign elites: Praxis, positionality, validity, and the cult of the insider. *Geoforum*, *30*(4), 313–327. https://doi.org/10.1016/S0016-7185(99)00024-X

Hess, D. J., & Renner, M. (2019). Conservative political parties and energy transitions in Europe: Opposition to climate mitigation policies. *Renewable and Sustainable Energy Reviews*, *104*, 419–428. https://doi.org/10.1016/j.rser.2019.01.019

Hickel, J. (2016, November 5). To deal with climate change we need a new financial system. *The Guardian*. https://www.theguardian.com/global-development-professionals-network/2016/nov/05/how-a-new-money-system-could-help-stop-climate-change

Hickel, J., Kallis, G., Jackson, T., O'Neill, D. W., Schor, J. B., Steinberger, J. K., Victor, P. A., & Ürge-Vorsatz, D. (2022). Degrowth can work—Here's how science can help. *Nature*, *612*(7940), 400–403. https://doi.org/10.1038/d41586-022-04412-x

Hickey-Moody, A. C. (2018). New Materialism, Ethnography, and Socially Engaged Practice: Space-Time Folds and the Agency of Matter. *Qualitative Inquiry*, 1077800418810728. https://doi.org/10.1177/1077800418810728

Hickey-Moody, A. C., Palmer, H., & Sayers, E. (2016). Diffractive pedagogies: Dancing across new materialist imaginaries. *Gender and Education*, *28*(2), 213–229. https://doi.org/10.1080/09540253.2016.1140723

Hickman, C., Marks, E., Pihkala, P., Clayton, S., Lewandowski, R. E., Mayall, E. E., Wray, B., Mellor, C., & van Susteren, L. (2021). Climate anxiety in children and young people and their beliefs about government responses to climate change: A global survey. *The Lancet Planetary Health*, *5*(12), e863–e873. https://doi.org/10.1016/S2542-5196(21)00278-3

Hickman, L. (2010, March 29). James Lovelock: Humans are too stupid to prevent climate change. *The Guardian*. https://www.theguardian.com/science/2010/mar/29/james-lovelock-climate-change

Higgins, K. (2016). Post-truth: A guide for the perplexed. *Nature News*, *540*(7631), 9. https://doi.org/10.1038/540009a

Hikuroa, D. (2017). Mātauranga Māori—The ūkaipō of knowledge in New Zealand. *Journal of the Royal Society of New Zealand*, *47*(1), 5–10. https://doi.org/10.1080/03036758.2016.1252407

Hipkins, R. (2004). The NCEA in the context of the knowledge society and national policy expectations. *New Zealand Annual Review of Education*, *14*(14), 27–38. https://doi.org/10.26686/nzaroe.v0i14.1486

Hipkins, R., Johnston, M., & Sheehan, M. (2016). *NCEA in context*. NZCER Press Wellington.

Hoefer, C. (2020). Scientific Realism without the Quantum. In C. Hoefer, *Scientific Realism and the Quantum* (pp. 19–34). Oxford University Press. https://doi.org/10.1093/oso/9780198814979.003.0002

Hoffmeyer, J. (2007). Semiotic scaffolding of living systems. In M. Barbieri (Ed.), *Introduction to biosemiotics: The new biological synthesis* (pp. 149–166). Springer.

Holland, E. W. (1999). *Deleuze and Guattari's Anti-Oedipus: Introduction to schizoanalysis*. Routledge. https://doi.org/10.4324/9780203007426

Hollingsworth, R. (2022). *Reflections on Transformation: How New Zealand Outdoor Educators Construct Programmes to Address (Non-religious) Spiritual Growth* [Thesis, Auckland University of Technology]. https://openrepository.aut.ac.nz/handle/10292/14996

Hollingworth, A. (2023). Election 2023: Farmers at Groundswell protest furious over climate regulations, but unconvinced by politicians' pitches. *Newshub*. https://www.newshub.co.nz/home/politics/2023/10/election-2023-farmers-at-groundswell-protest-furious-over-climate-regulations-but-unconvinced-by-politicians-pitches.html

Holmes, A. G. D. (2020). Researcher Positionality—A Consideration of Its Influence and Place in Qualitative Research—A New Researcher Guide. *Shanlax International Journal of Education*, *8*(4), 1–10. https://eric.ed.gov/?id=EJ1268044

Holzhey, C. F. E. (2021). Emergence that Matters and Emergent Irrelevance: On the Political Use of Fundamental Physics. In *Materialism and Politics* (pp. 253–268). ICI Berlin Press. https://doi.org/10.37050/ci-20_14

Honan, E., & Bright, D. (2016). Writing a thesis differently. *International Journal of Qualitative Studies in Education*, *29*(5), 731–743. https://doi.org/10.1080/09518398.2016.1145280

Hook, G. R. (2007). *A Future for Māori Education Part II: The Reintegration of Culture and Education*.

Hornsey, M. J., Harris, E. A., & Fielding, K. S. (2018). Relationships among conspiratorial beliefs, conservatism and climate scepticism across nations. *Nature Climate Change*, *8*(7), Article 7. https://doi.org/10.1038/s41558-018-0157-2

Houwer, R. (2014). Hopeful Practices: Activating and Enacting the Pedagogical and Political Potential in Crisis. In editor Larry Bencze & editor Steve Alsop (Eds.), *Activist Science and Technology Education* (1st ed. 2014.., pp. 113–126). Springer Netherlands. https://doi.org/10.1007/978-94-007-4360-1

Howard Sandoval, C., & Horton, J. L. (2023). 'Genocide is climate change': A conversation about colonized California and Indigenous futurism. *World Art*, *13*(2), 177–196. https://doi.org/10.1080/21500894.2023.2183520

Howard-Jones, P., Sands, D., Dillon, J., & Fenton-Jones, F. (2021). The views of teachers in England on an action-oriented climate change curriculum. *Environmental Education Research*, *27*(11), 1660–1680. https://doi.org/10.1080/13504622.2021.1937576

Howlett, M. (2022). Looking at the 'field'through a Zoom lens: Methodological reflections on conducting online research during a global pandemic. *Qualitative Research*, *22*(3), 387–402. https://doi.org/10.1177/1468794120985691

Huber, M. T. (2009). Energizing historical materialism: Fossil fuels, space and the capitalist mode of production. *Geoforum*, *40*(1), 105–115. https://doi.org/10.1016/j.geoforum.2008.08.004

Hughson, T. A. (2022). Disrupting Aotearoa New Zealand's Curricular Consensus: From 'World-Leading' Curriculum to Curriculum Refresh 2007–2021. *New Zealand Journal of Educational Studies*, *57*(1), 53–67. https://doi.org/10.1007/s40841-021-00238-9

IPCC. (n.d.). *About—IPCC*. Retrieved May 21, 2020, from https://www.ipcc.ch/about/

IPCC. (1990a). *Policymaker Summary of Working Group I (Scientific Assessment of Climate Change)*. IPCC. https://www.ipcc.ch/site/assets/uploads/2018/05/ipcc_90_92_assessments_far_wg_I_spm.pdf

IPCC. (1990b). *Policymaker Summary of Working Group II (Potential Impacts of Climate Change)*. IPCC. https://www.ipcc.ch/site/assets/uploads/2018/05/ipcc_90_92_assessments_far_wg_II_spm.pdf

IPCC. (2013). Summary for Policymakers. In *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (2013). Cambridge University Press. https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_SPM_FINAL.pdf

IPCC. (2018). Summary for Policymakers. In *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (p. 32). World Meteorological Organization. http://www.ipcc.ch/report/sr15/

IPCC. (2021). Summary for Policymakers. In *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (pp. 3–32). Cambridge University Press. https://doi.org/10.1017/9781009157896.001.

IPCC. (2023). Summary for Policymakers. In *Climate Change 2023: Synthesis Report* (p. 36). IPCC. https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf

Irwin, R. (2020). Climate change and education. *Educational Philosophy and Theory*, *52*(5), 492–507. https://doi.org/10.1080/00131857.2019.1642196

Irwin, R., & White, T. H. (2021). Negentropy for the anthropocene; Stiegler, Maori and exosomatic memory. *Educational Philosophy and Theory*, *0*(0), 1–13. https://doi.org/10.1080/00131857.2021.1970525

Iyengar, R., & Kwauk, C. (Eds.). (2021). *Curriculum and Learning for Climate Action: Toward an SDG 4.7 Roadmap for Systems Change*. Brill. https://brill.com/display/title/60973

Iyengar, S., & Massey, D. S. (2019). Scientific communication in a post-truth society. *Proceedings of the National Academy of Sciences*, *116*(16), 7656–7661. https://doi.org/10.1073/pnas.1805868115

Jacobson, G. C. (2021). Donald Trump's Big Lie and the Future of the Republican Party. *Presidential Studies Quarterly*, *51*(2), 273–289. https://doi.org/10.1111/psq.12716

Jacobson, G. C. (2023). The Dimensions, Origins, and Consequences of Belief in Donald Trump's Big Lie. *Political Science Quarterly*, *138*(2), 133–166. https://doi.org/10.1093/psquar/qqac030

Jarvis, P. (2011). *Paradoxes of learning: On becoming an individual in society* (Vol. 80). Routledge.

Jasanoff, S., & Simmet, H. R. (2017). No funeral bells: Public reason in a 'post-truth' age. *Social Studies of Science*, *47*(5), 751–770. https://doi.org/10.1177/0306312717731936

Jensen, C., Kotaish, M., Chopra, A., Jacob, K. A., Widekar, T. I., & Alam, R. (2019). Piloting a Methodology for Sustainability Education: Project Examples and Exploratory Action Research Highlights. *Emerging Science Journal*, *3*(5), Article 5. https://doi.org/10.28991/esj-2019-01194

Jensen, L. X., Bearman, M., Boud, D., & Konradsen, F. (2022). Digital ethnography in higher education teaching and learning—A methodological review. *Higher Education*, *84*(5), 1143–1162. https://doi.org/10.1007/s10734-022-00838-4

Joos, E. (2006). The Emergence of Classicality from Quantum Theory. In P. Clayton & P. Davies (Eds.), *The Re-Emergence of Emergence: The Emergentist Hypothesis from Science to Religion* (p. 53). Oxford University Press.

Joos, E. (2007). Decoherence: An Introduction. *Physics and Philosophy*. https://eldorado.tu-dortmund.de/bitstream/2003/24483/1/010.pdf

Joos, E., Zeh, H. D., Kiefer, C., Giulini, D. J., Kupsch, J., & Stamatescu, I.-O. (2013). *Decoherence and the appearance of a classical world in quantum theory*. Springer Science & Business Media.

Jung, J., Petkanic, P., Nan, D., & Kim, J. H. (2020). When a Girl Awakened the World: A User and Social Message Analysis of Greta Thunberg. *Sustainability*, *12*(7), 2707. https://doi.org/10.3390/su12072707

Just Stop Oil. (n.d.). Retrieved January 4, 2023, from https://juststopoil.org/

Karaka-Clarke, T. H., Bell, B., Eddy, L., Kennedy-Benns, M., Robertson, A., & Schrader Manuera, G. (2022). Ko ngā kete o te wānanga: A beginner's guide to understanding mātauranga Māori. *Set: Research Information for Teachers*, *1*, 2–11. https://doi.org/10.18296/set.0210

Katzenmeyer, M., & Moller, G. (2001). *Awakening the sleeping giant: Helping teachers develop as leaders* (2nd ed..). Corwin; SAGE.

Keen, A. (2011). *The Cult of the Amateur: How blogs, MySpace, YouTube and the rest of today's user-generated media are killing our culture and economy*. Hachette UK.

Keller, G., Mateo, P., Punekar, J., Khozyem, H., Gertsch, B., Spangenberg, J., Bitchong, A. M., & Adatte, T. (2018). Environmental changes during the Cretaceous-Paleogene mass extinction and Paleocene-Eocene Thermal Maximum: Implications for the Anthropocene. *Gondwana Research*, *56*, 69–89. https://doi.org/10.1016/j.gr.2017.12.002

Kelly, R. (2020, January 17). Federated Farmers launches petition against climate change teaching resource. *Stuff*. https://www.stuff.co.nz/southland-times/southland-top-stories/118855668/federated-farmers-launches-petition-against-climate-change-teaching-resource

Kemp, L., Xu, C., Depledge, J., Ebi, K. L., Gibbins, G., Kohler, T. A., Rockström, J., Scheffer, M., Schellnhuber, H. J., Steffen, W., & Lenton, T. M. (2022). Climate Endgame: Exploring catastrophic climate change scenarios. *Proceedings of the National Academy of Sciences*, *119*(34), e2108146119. https://doi.org/10.1073/pnas.2108146119

Kennedy, J. B. (2014). *Space, Time and Einstein: An Introduction*. Routledge.

Kerr, J., Thomson, G., & Wilson, N. (2023). *Cyclone Gabrielle joins list of Aotearoa NZ's 'sudden mass fatality events.'* https://ourarchive.otago.ac.nz/bitstream/handle/10523/15138/Cyclone%20Gabrielle%20joins%20list%20of%20Aotearoa%20NZ%E2%80%99s%20%E2%80%98sudden%20mass%20fatality%20events%E2%80%99%20_%20PHCC.pdf?sequence=1

Keyes, R. (2004). *The post-truth era: Dishonesty and deception in contemporary life*. St. Martin's Publishing Group.

Kiely, L., Parajuly, K., Green, J. A., & Fitzpatrick, C. (2021). Education for UN Sustainable Development Goal 12: A Cross-Curricular Program for Secondary Level Students. *Frontiers in Sustainability*, *2*. https://www.frontiersin.org/articles/10.3389/frsus.2021.638294

Kiger, M. E., & Varpio, L. (2020). Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical Teacher*, *42*(8), 846–854. https://doi.org/10.1080/0142159X.2020.1755030

Kingsbury, J. (2022). Taking taniwha seriously. *Asian Journal of Philosophy*, *1*(2), 49. https://doi.org/10.1007/s44204-022-00052-0

Kirshner, B. (2007). Introduction: Youth Activism as a Context for Learning and Development. *American Behavioral Scientist*, *51*(3), 367–379. https://doi.org/10.1177/0002764207306065

Kılıçoğlu, G., & Kılıçoğlu, D. Y. (2021). Understanding organizational hypocrisy in schools: The relationships between organizational legitimacy, ethical leadership, organizational hypocrisy and work-related outcomes. *International Journal of Leadership in Education*, *24*(1), 24–56. https://doi.org/10.1080/13603124.2019.1623924

Kleinherenbrink, A. (2019). Deleuze and Ontology. In *Against Continuity: Gilles Deleuze's Speculative Realism* (pp. 21–50). Edinburgh University Press. http://www.jstor.org/stable/10.3366/j.ctvxcrwvj.8

Klenert, D., Funke, F., Mattauch, L., & O'Callaghan, B. (2020). Five Lessons from COVID-19 for Advancing Climate Change Mitigation. *SSRN eLibrary*. https://doi.org/10.2139/ssrn.3622201

Knudsen, S. (2023). Critical realism in political ecology: An argument against flat ontology. *Journal of Political Ecology*, *30*(1), 1–22. https://doi.org/10.2458/jpe.issue.495

Kowhai, T. R. (2023). Rising racism and white supremacy in New Zealand forcing changes to basic Māori tikanga—Iwi leaders. *Newshub*. https://www.newshub.co.nz/home/new-zealand/2023/02/rising-racism-and-white-supremacy-in-new-zealand-forcing-changes-to-basic-m-ori-tikanga-iwi-leaders.html

Kreber, C., Klampfleitner, M., McCune, V., Bayne, S., & Knottenbelt, M. (2007). What Do You Mean By "Authentic"? A Comparative Review of the Literature On Conceptions of Authenticity in Teaching. *Adult Education Quarterly*, *58*(1), 22–43. https://doi.org/10.1177/0741713607305939

Kwauk, C. (2020). *Roadblocks to Quality Education in a Time of Climate Change*. BRIEF. https://files.eric.ed.gov/fulltext/ED607008.pdf

Kwauk, C. (2023). Education and Climate Change: Where Do We Go From Here? *NAEE Research Symposium*. NAAEE23 Conference: Together We Thrive, Virtual.

Kwauk, C., & Casey, O. (2021). A New Green Learning Agenda: Approaches to Quality Education for Climate Action. In *Center for Universal Education at The Brookings Institution* (p. 103). Center for Universal Education at The Brookings Institution. https://eric.ed.gov/?id=ED610523

Latour, B. (2017). *Facing Gaia: Eight lectures on the new climatic regime*. Polity Press.

Latulippe, N., & Klenk, N. (2020). Making room and moving over: Knowledge co-production, Indigenous knowledge sovereignty and the politics of global environmental change decision-making. *Current Opinion in Environmental Sustainability*, *42*, 7–14. https://doi.org/10.1016/j.cosust.2019.10.010

Lazarus, O., McDermid, S., & Jacquet, J. (2021). The climate responsibilities of industrial meat and dairy producers. *Climatic Change*, *165*(1), 30. https://doi.org/10.1007/s10584-021-03047-7

Lazrus, H., Maldonado, J., Blanchard, P., Souza, M. K., Thomas, B., & Wildcat, D. (2022). Culture change to address climate change: Collaborations with Indigenous and Earth sciences for more just, equitable, and sustainable responses to our climate crisis. *PLOS Climate*, *1*(2). https://doi.org/10.1371/journal.pclm.0000005

Le Quéré, C., Jackson, R. B., Jones, M. W., Smith, A. J. P., Abernethy, S., Andrew, R. M., De-Gol, A. J., Willis, D. R., Shan, Y., Canadell, J. G., Friedlingstein, P., Creutzig, F., & Peters, G. P. (2020). Temporary reduction in daily global CO 2 emissions during the COVID-19 forced confinement. *Nature Climate Change*, *10*(7), Article 7. https://doi.org/10.1038/s41558-020-0797-x

Leahy, S. C., Kearney, L., Reisinger, A., & Clark, H. (2019). Mitigating greenhouse gas emissions from New Zealand pasture-based livestock farm systems. *Journal of New Zealand Grasslands*, 101–110. https://doi.org/10.33584/jnzg.2019.81.417

Lee, H. (2003). Outcomes-based education and the cult of educational efficiency: Using curriculum and assessment reforms to drive educational policy and practice. *Education, Research and Perspectives*, *30*(2), 60–107.

Lethonen, A., Salonen, A. O., & Cantell, H. (2019). Climate Change Education: A New Approach for a World of Wicked Problems. In J. W. Cook (Ed.), *Sustainability, Human Well-Being, and the Future of Education* (pp. 339–374). Springer International Publishing. https://doi.org/10.1007/978-3-319-78580-6

Leung, L. E. (2020). *The Greta Effect: How does Greta Thunberg use the discourse of youth in her movement for climate justice* [Doctoral, University of Calgary]. https://arts.ucalgary.ca/sites/default/files/teams/21/Leung-Hons-Thesis-April-2020%20(1).pdf

Lewandowsky, S., Ecker, U. K. H., & Cook, J. (2017). Beyond Misinformation: Understanding and Coping with the "Post-Truth" Era. *Journal of Applied Research in Memory and Cognition*, *6*(4), 353–369. https://doi.org/10.1016/j.jarmac.2017.07.008

Lewis, T. (2006). Utopia and Education in Critical Theory. *Policy Futures in Education*, *4*(1), 6–17. https://doi.org/10.2304/pfie.2006.4.1.6

Li, C. J., & Monroe, M. C. (2019). Exploring the essential psychological factors in fostering hope concerning climate change. *Environmental Education Research*, *25*(6), 936–954. https://doi.org/10.1080/13504622.2017.1367916

Liefländer, A. K., Fröhlich, G., Bogner, F. X., & Schultz, P. W. (2013). Promoting connectedness with nature through environmental education. *Environmental Education Research*, *19*(3), 370–384. https://doi.org/10.1080/13504622.2012.697545

Lillis, D. D., & Schwerdtfeger, D. P. (2021). The Mātauranga Māori – Science Debate. *New Zealand Centre for Political Research*. https://www.nzcpr.com/the-matauranga-maori-science-debate/

Lorenz-Spreen, P., Oswald, L., Lewandowsky, S., & Hertwig, R. (2021). *A Systematic Review of Worldwide Causal and Correlational Evidence on Digital Media and Democracy*. SocArXiv. https://doi.org/10.31235/osf.io/p3z9v

Louw, S. (2021). Automated transcription software in qualitative research. *Proceedings of the International Conference: DRAL4 2021*, 12. https://sola.pr.kmutt.ac.th/dral2021/wp-content/uploads/2022/06/1.pdf

Macaulay, G. C., Simpson, J., Parnell, W., & Duncanson, M. (2023). Food insecurity as experienced by New Zealand women and their children. *Journal of the Royal Society of New Zealand*, *53*(5), 553–569. https://doi.org/10.1080/03036758.2022.2088574

Macfarlane, A. H. (2015). Restlessness, Resoluteness and Reason: Looking Back at 50 Years of Māori Education. *New Zealand Journal of Educational Studies*, *50*(2), 177–193. https://doi.org/10.1007/s40841-015-0023-y

Macfarlane, A., & Macfarlane, S. (2019). Listen to culture: Māori scholars' plea to researchers. *Journal of the Royal Society of New Zealand*, *49*(sup1), 48–57. https://doi.org/10.1080/03036758.2019.1661855

Mackinac Center for Public Policy. (n.d.). *The Overton Window*. Mackinac Center. Retrieved May 30, 2022, from https://www.mackinac.org/OvertonWindow

MacLure, M. (2017). Qualitative methodology and the new materialisms: "A little of Dionysus's blood?" In N. K. Denzin & M. D. Giardina (Eds.), *Qualitative inquiry in neoliberal times* (pp. 48–58). Routledge.

Macy, J., & Brown, M. Y. (1998). *Coming back to life: Practices to reconnect our lives, our world*. New Society Publishers Gabriola Island, BC.

Mannion, G. (2019). Re-assembling environmental and sustainability education: Orientations from new materialism. *Environmental Education Research*, *0*(0), 1–20. https://doi.org/10.1080/13504622.2018.1536926

Manzanedo, R. D., & Manning, P. (2020). COVID-19: Lessons for the climate change emergency. *Science of The Total Environment*, *742*, 140563. https://doi.org/10.1016/j.scitotenv.2020.140563

Marcus, G., Davis, E., & Aaronson, S. (2022). *A very preliminary analysis of DALL-E 2* (arXiv:2204.13807). arXiv. https://arxiv.org/abs/2204.13807

Marginson, S. (2022). Globalization in higher education: The good, the bad and the ugly. In F. Rizvi, B. Lingard, & R. Rinne (Eds.), *Reimagining Globalization and Education* (pp. 11–30). Routledge.

Mark, J. (2016). Big Oil in the Hot Seat. *Sierra*, *101*(3), 28–29. http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=114641615&site=ehost-live&custid=s4804380

Marn, T. M., & Wolgemuth, J. R. (2017). Purposeful Entanglements: A New Materialist Analysis of Transformative Interviews. *Qualitative Inquiry*, *23*(5), 365–374. https://doi.org/10.1177/1077800416659085

Marriott, L., & Sim, D. (2015). Indicators of inequality for Maori and Pacific people. *Journal of New Zealand Studies*, *20*, 24–50. https://doi.org/10.3316/informit.276927349255099

Martin, B. (2016). Taking Responsibility into all Matter: Engaging Levinas for the climate of the 21st Century. *Educational Philosophy and Theory*, *48*(4), 418–435. https://doi.org/10.1080/00131857.2015.1044927

Martin, L., White, M. P., Hunt, A., Richardson, M., Pahl, S., & Burt, J. (2020). Nature contact, nature connectedness and associations with health, wellbeing and pro-environmental behaviours. *Journal of Environmental Psychology*, *68*, 101389. https://doi.org/10.1016/j.jenvp.2020.101389

Mason, J. (2002). *Qualitative researching* (2nd ed..). Sage Publications.

Mataira, N. M., Peter J. (2013). From Trauma to Triumph: Perspectives for Native Hawaiian and Māori Peoples. In *Decolonizing Social Work*. Routledge.

Mayo, P. (2020). Critical Pedagogy in Difficult Times. In S. L. Macrine (Ed.), *Critical Pedagogy in Uncertain Times: Hope and Possibilities* (pp. 33–43). Springer International Publishing. https://doi.org/10.1007/978-3-030-39808-8

Mazzei, L. A., & Jackson, A. Y. (2017). Voice in the agentic assemblage. *Educational Philosophy and Theory*, *49*(11), 1090–1098. https://doi.org/10.1080/00131857.2016.1159176

Mbah, M., Ajaps, S., & Molthan-Hill, P. (2021). A Systematic Review of the Deployment of Indigenous Knowledge Systems towards Climate Change Adaptation in Developing World Contexts: Implications for Climate Change Education. *Sustainability*, *13*(9), Article 9. https://doi.org/10.3390/su13094811

McAdam, D. (2017). Social Movement Theory and the Prospects for Climate Change Activism in the United States. *Annual Review of Political Science*, *20*(1), 189–208. https://doi.org/10.1146/annurev-polisci-052615-025801

McCright, A. M., & Dunlap, R. E. (2011). The Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001–2010. *The Sociological Quarterly*, *52*(2), 155–194. https://doi.org/10.1111/j.1533-8525.2011.01198.x

McGregor, C., & Christie, B. (2021). Towards climate justice education: Views from activists and educators in Scotland. *Environmental Education Research*, *27*(5), 652–668. https://doi.org/10.1080/13504622.2020.1865881

Mcphie, J., & Clarke, D. A. G. (2015). A Walk in the Park: Considering Practice for Outdoor Environmental Education Through an Immanent Take on the Material Turn. *The Journal of Environmental Education*, *46*(4), 230–250. https://doi.org/10.1080/00958964.2015.1069250

Meadows, D. H., Meadows, D. L., Randers, J., & Behrens, W. W. (1972). The limits to growth. *New York*, *102*(1972), 27.

Meehan, L., Pacheco, G., & Pushon, Z. (2019). Explaining ethnic disparities in bachelor's degree participation: Evidence from NZ. *Studies in Higher Education*, *44*(7), 1130–1152. https://doi.org/10.1080/03075079.2017.1419340

Meillassoux, Q. (2009). *After Finitude: An Essay on the Necessity of Contingency*. Bloomsbury Publishing. https://books.google.co.nz/books?hl=en&lr=&id=EGrOBAAAQBAJ&oi=fnd&pg=PR5&ots=FNfbwm2RIo&sig=IfylpM2GSGiK1BZHJiEKhk23UZE

Meillassoux, Q. (2016). Iteration, Reiteration, Repetition: A Speculative Analysis of the Sign Devoid of Meaning. In S. Malik & A. Avanessian (Eds.), *Genealogies of Speculation: Materialism and Subjectivity Since Structuralism*. Bloomsbury Academic. https://doi.org/10.5040/9781474220354

Merz, J., Barnard, P., Rees, W., Smith, D., Maroni, M., Rhodes, C., Dederer, J., Bajaj, N., Joy, M., Wiedmann, T., & Sutherland, R. (2023). World scientists' warning: The behavioural crisis driving ecological overshoot. *Science Progress*, *106*, 1–22. https://doi.org/10.1177/00368504231201372

Messina, K. E. (2022). *Resurgence of Global Populism: A Psychoanalytic Study of Projective Identification, Blame-Shifting and the Corruption of Democracy*. Taylor & Francis.

MfE. (n.d.). *Government climate-change work programme*. Ministry for the Environment. Retrieved September 18, 2023, from https://environment.govt.nz/what-government-is-doing/areas-of-work/climate-change/about-new-zealands-climate-change-programme/

MfE. (2007). *Consultation with Māori on climate change: Hui report.* Ministry for the Environment. https://environment.govt.nz/assets/Publications/Files/consultation-maori-hui-report-nov07.pdf

MfE. (2020, June 6). *Paris Agreement*. Ministry for the Environment. https://environment.govt.nz/what-government-is-doing/international-action/about-the-paris-agreement/

MfE. (2022a). *New Zealand's Greenhouse Gas Inventory 1990-2020 snapshot*. Ministry for the Environment. https://environment.govt.nz/publications/new-zealands-greenhouse-gas-inventory-1990-2020-snapshot/

MfE. (2022b). *Te hau mārohi ki anamata Towards a productive, sustainable and inclusive economy: AOTEAROA NEW ZEALAND'S FIRST EMISSIONS REDUCTION PLAN*. Ministry for the Environment. https://environment.govt.nz/assets/publications/Aotearoa-New-Zealands-first-emissions-reduction-plan.pdf

MfE, & MPI. (2022). *Pricing agricultural emissions: Summary of the consultation*. New Zealand Government. https://www.beehive.govt.nz/sites/default/files/2022-10/Pricing%20agricultural%20emissions%20summary%20of%20the%20consultation.pdf

Mignolo, W. D. (2007). Delinking: The rhetoric of modernity, the logic of coloniality and the grammar of de-coloniality. *Cultural Studies*, *21*(2–3), 449–514. https://doi.org/10.1080/09502380601162647

Milfont, T. L., Milojev, P., Greaves, L. M., & Sibley, C. G. (2015). Socio-structural and psychological foundations of climate change beliefs. *New Zealand Journal of Psychology*, *44*(1). https://www.psychology.org.nz/journal-archive/Article-21.pdf

Miller, C. L. (1993). The Postidentitarian Predicament in the Footnotes of A Thousand Plateaus: Nomadology, Anthropology, and Authority. *Diacritics*, *23*(3), 6–35. https://doi.org/10.2307/465398

Ministry of Health. (2019). *Household Food Insecurity Among Children: New Zealand Health Survey* (p. 82). Ministry of Health. https://www.health.govt.nz/system/files/documents/publications/household-food-insecurity-among-children-new-zealand-health-survey-jun19.pdf

MoE. (n.d.-a). *Education in New Zealand*. Ministry of Education. Retrieved August 13, 2020, from https://www.education.govt.nz/our-work/our-role-and-our-people/education-in-nz/

MoE. (n.d.-b). *What is the NCEA Change Programme*. NCEA | Ministry of Education. Retrieved June 12, 2023, from https://ncea.education.govt.nz/what-ncea-change-programme

MoE. (2007). *The New Zealand Curriculum*. Ministry of Education. https://nzcurriculum.tki.org.nz/The-New-Zealand-Curriculum

MoE. (2019). *NCEA Change Package 2019, Overview*. Ministry of Education. https://conversation-live-storagesta-assetstorages3bucket-jsvm6zoesodc.s3.ap-southeast-2.amazonaws.com/public/NCEA/NCEA-Change-Package-2019-Web.pdf

Momennejad, I. (2021). Collective minds: Social network topology shapes collective cognition. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *377*(1843), 20200315. https://doi.org/10.1098/rstb.2020.0315

Moser, K. (2019). Edgar Morin's "Complex Thought": A Blueprint for Reconstituting our Ecological Self in the Anthropocene Epoch? *Journal of Comparative Literature and Aesthetics*, *42*(2), 20–33. https://go.gale.com/ps/i.do?p=AONE&sw=w&issn=02528169&v=2.1&it=r&id=GALE%7CA601909044&sid=googleScholar&linkaccess=abs

Muis, K. R., Pekrun, R., Sinatra, G. M., Azevedo, R., Trevors, G., Meier, E., & Heddy, B. C. (2015). The curious case of climate change: Testing a theoretical model of epistemic beliefs, epistemic emotions, and complex learning. *Learning and Instruction*, *39*, 168–183. https://doi.org/10.1016/j.learninstruc.2015.06.003

Mulholland, M., & Tawhai, V. (2011). *Weeping Waters: The Treaty of Waitangi and Constitutional Change*. Huia Publishers.

Munro, I., & Thanem, T. (2018). Deleuze and the deterritorialization of strategy. *Critical Perspectives on Accounting*, *53*, 69–78. https://doi.org/10.1016/j.cpa.2017.03.012

Munshi, D., Cretney, R., Kurian, P., Morrison, S. L., & Edwards, A. (2022). Culture and politics in overlapping frames for the future: Multi-dimensional activist organizing and communicating on climate change in Aotearoa New Zealand. *Organization*, 13505084221131641. https://doi.org/10.1177/13505084221131641

Murphy, P. D. (2021). Speaking for the youth, speaking for the planet: Greta Thunberg and the representational politics of eco-celebrity. *Popular Communication*, *19*(3), 193–206. https://doi.org/10.1080/15405702.2021.1913493

Murris, K., & Bozalek, V. (2019). Diffraction and response-able reading of texts: The relational ontologies of Barad and Deleuze. *International Journal of Qualitative Studies in Education*, *32*(7), 872–886. https://doi.org/10.1080/09518398.2019.1609122

Mustonen, T., Harper, S. L., Revera Ferre, M., Postigo, J., Ayanlande, A., & Benjamsen, T. (2021). *2021 Compendium of Indigenous Knowledge and Local Knowledge: Towards Inclusion of Indigenous Knowledge and Local Knowledge in Global Reports on Climate Change.* (R. Morgan & A. Okem, Eds.). Snowchange Cooperative.

Mutu, M. (2019). 'To honour the treaty, we must first settle colonisation' (Moana Jackson 2015): The long road from colonial devastation to balance, peace and harmony. *Journal of the Royal Society of New Zealand*, *49*(sup1), 4–18. https://doi.org/10.1080/03036758.2019.1669670

Nairn, K. (2019). Learning from Young People Engaged in Climate Activism: The Potential of Collectivizing Despair and Hope. *YOUNG*, *27*(5), 435–450. https://doi.org/10.1177/1103308818817603

NASA. (2023). *NASA Announces Summer 2023 Hottest on Record*. Climate Change: Vital Signs of the Planet. https://climate.nasa.gov/news/3282/nasa-announces-summer-2023-hottest-on-record

Nash, R. (1990). Bourdieu on Education and Social and Cultural Reproduction. *British Journal of Sociology of Education*, *11*(4), 431–447. https://doi.org/10.1080/0142569900110405

Nässén, N., & Rambaree, K. (2021). Greta Thunberg and the Generation of Moral Authority: A Systematic Literature Review on the Characteristics of Thunberg's Leadership. *Sustainability*, *13*(20), Article 20. https://doi.org/10.3390/su132011326

National Research Council. (1979). *Carbon Dioxide and Climate: A Scientific Assessment*. National Academies Press.

Naufahu, M. (2018). A Pasifika research methodology: Talaloto. *Waikato Journal of Education (Online)*, *23*(1), 15–24. https://doi.org/10.15663/wje.v23i1.635

Neimanis, A., & Walker, R. L. (2014). Weathering: Climate Change and the "Thick Time" of Transcorporeality. *Hypatia*, *29*(3), 558–575. https://doi.org/10.1111/hypa.12064

Nelson, C., & Grossberg, L. (Eds.). (1988). *Marxism and the Interpretation of Culture*. University of Illinois Press.

Nelson, J. (2020). Petro-masculinity and climate change denial among white, politically conservative American males. *International Journal of Applied Psychoanalytic Studies*, *17*(4), 282–295. https://doi.org/10.1002/aps.1638

New Zealand Parliament. (2020, December 2). *Climate Change—Declaration of Emergency*. New Zealand Parliament. https://www.parliament.nz/en/pb/hansard-debates/rhr/combined/HansDeb_20201202_20201202_08

New Zealand Taskforce to Review Education Administration. (1988). *Administering for excellence: Effective administration in education : report / of the Taskforce to Review Education Administration.* The Taskforce.

Newman, R., Adams-Kane, J., & Nicholls, K. (2023). *2022 flood risk assessment for residential mortgages* (p. 14) [RBNZ Bulletin]. Reserve Bank of New Zealand. https://www.rbnz.govt.nz/-/media/project/sites/rbnz/files/publications/bulletins/2023/rbb-2023-86-02.pdf

Nguyen, X. P., Hoang, A. T., Ölçer, A. I., & Huynh, T. T. (2021). Record decline in global CO2 emissions prompted by COVID-19 pandemic and its implications on future climate change policies. *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*, *0*(0), 1–4. https://doi.org/10.1080/15567036.2021.1879969

NIWA. (2023, July 6). *2023 so far: NZ's record-breaking weather*. NIWA. https://niwa.co.nz/news/2023-so-far-nzs-record-breaking-weather

North, P. (2011). The Politics of Climate Activism in the UK: A Social Movement Analysis. *Environment and Planning A: Economy and Space*, *43*(7), 1581–1598. https://doi.org/10.1068/a43534

NZ Coal. (2021, August 16). *New Zealand economy and coal*. Coal in New Zealand. https://coal.org.nz/economy-coal/

NZ Loyal Party. (2023). *NZ Loyal, Policy Overview*. New Zealand Loyal. https://nzloyal.org.nz/pages/policy-overview

NZEI. (n.d.). Climate action for educators—Mātauranga Māui [Facebook]. *Climate Action for Educators - Mātauranga Māui*. Retrieved October 22, 2023, from https://www.facebook.com/groups/305543770221812/

NZEI Te Riu Roa. (n.d.). Retrieved August 2, 2022, from https://www.nzei.org.nz/

NZQA. (n.d.). *Understanding NCEA*. New Zealand Qualifications Authority. Retrieved February 3, 2023, from https://www.nzqa.govt.nz/ncea/understanding-ncea/

Obydenkova, A. V., & Salahodjaev, R. (2017). Climate change policies: The role of democracy and social cognitive capital. *Environmental Research*, *157*, 182–189. https://doi.org/10.1016/j.envres.2017.05.009

OECD. (2007). *PISA 2006 Science Competencies for Tomorrow's World: Volume 1: Analysis*. OECD Publishing.

Ojala, M. (2021). Safe spaces or a pedagogy of discomfort? Senior high-school teachers' meta-emotion philosophies and climate change education. *The Journal of Environmental Education*, *52*(1), 40–52. https://doi.org/10.1080/00958964.2020.1845589

Okada, A., & Gray, P. (2023). A Climate Change and Sustainability Education Movement: Networks, Open Schooling, and the 'CARE-KNOW-DO' Framework. *Sustainability*, *15*(3), Article 3. https://doi.org/10.3390/su15032356

Oldfield, L. D., & van Veen, J. (2023). Winston Peters and the populist tendency in New Zealand politics. In D. B. Subedi, H. Brasted, K. von Strokirch, & A. Scott (Eds.), *The Routledge Handbook of Populism in the Asia Pacific*. Taylor & Francis.

OpenAI. (n.d.). *DALL·E 2*. Retrieved April 7, 2023, from https://openai.com/dall-e-2/

Oram, R. (2022, June 10). *Rod Oram: The leaky logic of emissions leakage in farming climate plan*. Newsroom. https://www.newsroom.co.nz/page/rod-oram-the-leaky-logic-of-emissions-leakage-in-farming-climate-plan

Orange, C. (2021). *The Treaty of Waitangi /Te Tiriti o Waitangi*. Bridget Williams Books.

Oreskes, N. (2020). What Is the Social Responsibility of Climate Scientists? *Daedalus*, *149*(4), 33–45. https://doi.org/10.1162/daed_a_01815

Oreskes, N., & Conway, E. M. (2010). *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (1st ed.). Bloomsbury Press.

Orlie, M. A. (2010). Impersonal Matter. In D. Coole & S. Frost (Eds.), *New materialisms: Ontology, agency, and politics* (pp. 116–136). Duke University Press. https://doi.org/10.1515/9780822392996

Ostrom, E. (2000). Collective Action and the Evolution of Social Norms. *Journal of Economic Perspectives*, *14*(3), 137–158. https://doi.org/10.1257/jep.14.3.137

O'Sullivan, N. (2019). Walking backwards into the future: Indigenous wisdom within design education. *Educational Philosophy and Theory*, *51*(4), 424–433. https://doi.org/10.1080/00131857.2018.1476236

Otto, S., & Pensini, P. (2017). Nature-based environmental education of children: Environmental knowledge and connectedness to nature, together, are related to ecological behaviour. *Global Environmental Change*, *47*, 88–94. https://doi.org/10.1016/j.gloenvcha.2017.09.009

Ozden, J., & Glover, S. (2022). Disruptive climate protests in the UK didn't lead to a loss of public support for climate policies. *Effective Altruism Forum*. https://forum.effectivealtruism.org/posts/YDtsGHmDJMsAWB7Wt/disruptive-climate-protests-in-the-uk-didn-t-lead-to-a-loss

Pachilla, P. (2022). The Eye is in Things: On Deleuze and Speculative Realism. *Comparative and Continental Philosophy*, *14*(1), 44–56. https://doi.org/10.1080/17570638.2022.2093481

Panarello, D. (2021). Economic insecurity, conservatism, and the crisis of environmentalism: 30 years of evidence. *Socio-Economic Planning Sciences*, *73*, 100925. https://doi.org/10.1016/j.seps.2020.100925

Parker, T. (2019). The Greta Effect. *The Perspective*. http://www.theperspective.se/the-greta-effect/

Patton, P. (2006). The Event of Colonisation. In I. Buchanan & A. Parr (Eds.), *Deleuze and the contemporary world* (pp. 108–124). Edinburgh University Press.

Peart, R., Boston, J., Maher, S., & Konlechner, T. (2023). *PRINCIPLES AND FUNDING FOR MANAGED RETREAT*. Environmental Defence Society Incorporated.

Pedersen, H. (2010). Education Policymaking for Social Change: A Post-Humanist Intervention. *Policy Futures in Education*, *8*(6), 683–696. https://doi.org/10.2304/pfie.2010.8.6.682

Pennycook, A. (2021). Reassembling linguistics: Semiotic and epistemic assemblages. *Crossing Borders, Making Connections: Interdisciplinarity in Linguistics*, *1*, 111.

Pereira, M. G., Parente, J., Amraoui, M., Oliveira, A., & Fernandes, P. M. (2020). The role of weather and climate conditions on extreme wildfires. In *Extreme Wildfire Events and Disasters* (pp. 55–72). Elsevier. https://doi.org/10.1016/B978-0-12-815721-3.00003-5

Perkins, P. E. (Ellie). (2019). Climate justice, commons, and degrowth. *Ecological Economics*, *160*, 183–190. https://doi.org/10.1016/j.ecolecon.2019.02.005

Peschl, M. F., & Riegler, A. (1999). Does Representation Need Reality? In A. Riegler, M. Peschl, & A. von Stein (Eds.), *Understanding Representation in the Cognitive Sciences* (pp. 9–17). Springer US. https://doi.org/10.1007/978-0-585-29605-0_1

Peterson, W. (2001). Reclaiming the Past, Building a Future: Māori Identity in the Plays of Hone Kouka. *Theatre Research International*, *26*(1), 15–24. https://doi.org/10.1017/S0307883301000025

Pihkala, P. (2020). Eco-Anxiety and Environmental Education. *Sustainability*, *12*(23), Article 23. https://doi.org/10.3390/su122310149

Pihkala, P. (2022). Eco-Anxiety and Pastoral Care: Theoretical Considerations and Practical Suggestions. *Religions*, *13*(3), 192. https://doi.org/10.3390/rel13030192

Pirchio, S., Passiatore, Y., Panno, A., Cipparone, M., & Carrus, G. (2021). The Effects of Contact With Nature During Outdoor Environmental Education on Students' Wellbeing, Connectedness to Nature and Pro-sociality. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.648458

Plautz, J. (2020). *Eco-anxiety is overwhelming kids. Where's the line between education and alarmism?* Washington Post. https://www.washingtonpost.com/magazine/2020/02/03/eco-anxiety-is-overwhelming-kids-wheres-line-between-education-alarmism/

Plumwood, V. (2002). *Environmental culture: The ecological crisis of reason*. Psychology Press.

Povitkina, M. (2018). The limits of democracy in tackling climate change. *Environmental Politics*, *27*(3), 411–432. https://doi.org/10.1080/09644016.2018.1444723

Prasad, A. (2022). Anti-science Misinformation and Conspiracies: COVID–19, Post-truth, and Science & Technology Studies (STS). *Science, Technology and Society*, *27*(1), 88–112. https://doi.org/10.1177/09717218211003413

Prensky, M. (2009). H. Sapiens Digital: From Digital Immigrants and Digital Natives to Digital Wisdom. *Innovate: Journal of Online Education*, *5*(3). https://www.learntechlib.org/p/104264/

Pritchard, A., Richardson, M., Sheffield, D., & McEwan, K. (2020). The Relationship Between Nature Connectedness and Eudaimonic Well-Being: A Meta-analysis. *Journal of Happiness Studies*, *21*(3), 1145–1167. https://doi.org/10.1007/s10902-019-00118-6

Probert, A. (Ed.). (2011). *The wealth beneath our feet*. Venture Taranaki Trust.

Quackenbush, C. (2022, May 24). The climate scientists are not alright. *Washington Post*. https://www.washingtonpost.com/climate-environment/2022/05/20/climate-change-scientists-protests/

Quijano, A. (2007). Coloniality and Modernity/Rationality. *Cultural Studies*, *21*(2–3), 168–178. https://doi.org/10.1080/09502380601164353

Raymond, C., Matthews, T., & Horton, R. M. (2020). The emergence of heat and humidity too severe for human tolerance. *Science Advances*, *6*(19), eaaw1838. https://doi.org/10.1126/sciadv.aaw1838

Reform of Education Administration Charters Working Group. (1988). *Tomorrow's schools: Report from the Charters Working Group.* Implementation Unit, Dept. of Education.

Reid, J. (2003). Deleuze's war machine: Nomadism against the State. *Millennium*, *32*(1), 57–85. https://doi.org/10.1177/03058298030320010301

Reimer, N. (2019, September 18). "Climate Change" or "Climate Crisis" – What's the right lingo? [Blog]. *Clean Energy Wire: Journalism for the Energy Transition*. https://www.cleanenergywire.org/blog/climate-change-or-climate-crisis-whats-right-lingo

Reisinger, A. (2018). *The contribution of methane emissions from New Zealand livestock to global warming* (p. 44) [Report to the Parliamentary Commissioner for the Environment]. New Zealand Agricultural Greenhouse Gas Research Centre (NZAGRC). https://www.pce.parliament.nz/media/196482/contribution-of-methane-emissions-from-nz-livestock-to-global-warming.pdf

Restall, B., & Conrad, E. (2015). A literature review of connectedness to nature and its potential for environmental management. *Journal of Environmental Management*, *159*, 264–278. https://doi.org/10.1016/j.jenvman.2015.05.022

Rhead, R., Elliot, M., & Upham, P. (2018). Using latent class analysis to produce a typology of environmental concern in the UK. *Social Science Research*, *74*, 210–222. https://doi.org/10.1016/j.ssresearch.2018.06.001

Riegler, A. (2001). Towards a Radical Constructivist Understanding of Science. *Foundations of Science*, *6*(1–3), 1–30. https://doi.org/10.1023/a:1011305022115

Ringrose, J. (2011). Beyond Discourse? Using Deleuze and Guattari's schizoanalysis to explore affective assemblages, heterosexually striated space, and lines of flight online and at school. *Educational Philosophy and Theory*, *43*(6), 598–618. https://doi.org/10.1111/j.1469-5812.2009.00601.x

Ringrose, J., Warfield, K., & Zarabadi, S. (Eds.). (2019). *Feminist posthumanisms, new materialisms and education*. Routledge, Taylor & Francis Group.

Ripple, W. J., Wolf, C., Gregg, J. W., Levin, K., Rockström, J., Newsome, T. M., Betts, M. G., Huq, S., Law, B. E., Kemp, L., Kalmus, P., & Lenton, T. M. (2022). World Scientists' Warning of a Climate Emergency 2022. *BioScience*, *72*(12), 1149–1155. https://doi.org/10.1093/biosci/biac083

Ritchie, H., Roser, M., & Rosado, P. (2020). CO2 Concentration and Mitigation Pathways. *Our World in Data*. https://ourworldindata.org/co2-and-greenhouse-gas-emissions

Ritchie, J. (2022, December 11). Climate change education needs to better engage pupils. *Newsroom*. https://www.newsroom.co.nz/ideasroom/page/climate-change-education-needs-to-better-engage-pupils

Rizvi, F., Lingard, B., & Rinne, R. (2022). *Reimagining Globalization and Education* (1st ed.). Routledge. https://doi.org/10.4324/9781003207528

RNZ. (2023, September 26). Election 2023: ACT promises to scrap several climate change policies. *RNZ*. https://www.rnz.co.nz/news/political/498802/election-2023-act-promises-to-scrap-several-climate-change-policies

Rödder, S., & Pavenstädt, C. N. (2023). 'Unite behind the Science!' Climate movements' use of scientific evidence in narratives on socio-ecological futures. *Science and Public Policy*, *50*(1), 30–41. https://doi.org/10.1093/scipol/scac046

Rodgers, C. R., & Scott, K. H. (2008). The development of the personal self and professional identity in learning to teach. In M. Cochran-Smith, S. Feiman-Nemser, D. J. McIntyre, & K. E. Demers (Eds.), *Handbook of research on teacher education* (Third Edition, pp. 732–755). Routledge, Taylor & Francis Group.

Roffe, J., & Stark, H. (2015). Deleuze and the Nonhuman Turn: An Interview with Elizabeth Grosz. In J. Roffe & H. Stark (Eds.), *Deleuze and the Non/Human* (pp. 17–24). Palgrave Macmillan UK. https://doi.org/10.1057/9781137453693_2

Roser-Renouf, C., Maibach, E. W., Leiserowitz, A., & Zhao, X. (2014). The genesis of climate change activism: From key beliefs to political action. *Climatic Change*, *125*(2), 163–178. https://doi.org/10.1007/s10584-014-1173-5

Rosiek, J. L., Snyder, J., & Pratt, S. L. (2020). The New Materialisms and Indigenous Theories of Non-Human Agency: Making the Case for Respectful Anti-Colonial Engagement. *Qualitative Inquiry*, *26*(3–4), 331–346. https://doi.org/10.1177/1077800419830135

Roth, S. (2021). The Great Reset. Restratification for lives, livelihoods, and the planet. *Technological Forecasting and Social Change*, *166*, 120636. https://doi.org/10.1016/j.techfore.2021.120636

Roth, W.-M. (2014). From-Within-the-Event: A Post-constructivist Perspective on Activism, Ethics, and Science Education. In editor Larry Bencze & editor Steve Alsop (Eds.), *Activist Science and Technology Education* (1st ed. 2014.., pp. 237–254). Springer Netherlands. https://doi.org/10.1007/978-94-007-4360-1

Rousell, D., Cutter-Mackenzie, A., & Foster, J. (2017). Children of an Earth to Come: Speculative Fiction, Geophilosophy and Climate Change Education Research. *Educational Studies*, *53*(6), 654–669. https://doi.org/10.1080/00131946.2017.1369086

Rousell, D., & Cutter-Mackenzie-Knowles, A. (2020). A systematic review of climate change education: Giving children and young people a 'voice' and a 'hand' in redressing climate change. *Children's Geographies*, *18*(2), 191–208. https://doi.org/10.1080/14733285.2019.1614532

Rousell, D., & Cutter-Mackenzie-Knowles, A. (2022). *Posthuman research playspaces: Climate child imaginaries*. Routledge. https://doi.org/10.4324/9781003336006

Royal, T. A. C. (2008). *Te Ngākau: He Wānanga i te Mātauranga kia puta he aroha, he māramatanga*. Mauriora ki te Ao/Living Universe. https://researchspace.auckland.ac.nz/handle/2292/17250

Royal, T. A. C. (2020). Politics and knowledge: Kaupapa Maori and matauranga Maori. *New Zealand Journal of Educational Studies*, *47*(2), 30–37. https://doi.org/10.3316/informit.446746674901479

Ruck, A., & Mannion, G. (2019). Fieldnotes and situational analysis in environmental education research: Experiments in new materialism. *Environmental Education Research*, *0*(0), 1–18. https://doi.org/10.1080/13504622.2019.1594172

Saldanha, A., & Stark, H. (2016). A New Earth: Deleuze and Guattari in the Anthropocene. *Deleuze Studies*, *10*(4), 427–439. https://doi.org/10.3366/dls.2016.0237

Salinger, M. J., Diamond, H. J., Bell, J., Behrens, E., Fitzharris, B. B., Herod, N., McLuskie, M., Parker, A. K., Ratz, H., Renwick, J., Scofield, C., Shears, N. T., Smith, R. O., Sutton, P. J., & Trought, M. C. T. (2023). Coupled ocean-atmosphere summer heatwaves in the New Zealand region: An update. *Weather and Climate*, *42*(1), 18–41. https://doi.org/10.2307/27226713

Salinger, M. J., Renwick, J., Behrens, E., Mullan, A. B., Diamond, H. J., Sirguey, P., Smith, R. O., Trought, M. C. T., Alexander, L., Cullen, N. J., Fitzharris, B. B., Hepburn, C. D., Parker, A. K., & Sutton, P. J. (2019). The unprecedented coupled ocean-atmosphere summer heatwave in the New Zealand region 2017/18: Drivers, mechanisms and impacts. *Environmental Research Letters*, *14*(4), 044023. https://doi.org/10.1088/1748-9326/ab012a

Salman, S. (2023). Playing in the Team of Five Million: Conformity and Nonconformity to the New Zealand Covid-19 Pandemic Response. *Critical Criminology*, *31*(2), 343–361. https://doi.org/10.1007/s10612-023-09707-7

Santone, S. (2018). *Reframing the Curriculum: Design for Social Justice and Sustainability*. Routledge. https://doi.org/10.4324/9780203728680

Schadler, C. (2019). Enactments of a new materialist ethnography: Methodological framework and research processes. *Qualitative Research*, *19*(2), 215–230. https://doi.org/10.1177/1468794117748877

Schellnhuber, H. J., Serdeczny, O. M., Adams, S., Köhler, C., Magdalena Otto, I., & Schleussner, C.-F. (2016). The Challenge of a 4°C World by 2100. In H. G. Brauch, Ú. Oswald Spring, J. Grin, & J. Scheffran (Eds.), *Handbook on Sustainability Transition and Sustainable Peace* (pp. 267–283). Springer International Publishing. https://doi.org/10.1007/978-3-319-43884-9_11

Schiel, D., Ross, P., & Battershill, C. (2016). Environmental effects of the MV Rena shipwreck: Cross-disciplinary investigations of oil and debris impacts on a coastal ecosystem. *New Zealand Journal of Marine and Freshwater Research*, *50*(1), 1–9. https://doi.org/10.1080/00288330.2015.1133665

Schlosshauer, M. (2019). Quantum decoherence. *Physics Reports*, *831*, 1–57. https://doi.org/10.1016/j.physrep.2019.10.001

Schmid, B. (2019). Degrowth and postcapitalism: Transformative geographies beyond accumulation and growth. *Geography Compass*, *13*(11), e12470. https://doi.org/10.1111/gec3.12470

Sciberras, E., & Fernando, J. W. (2022). Climate change-related worry among Australian adolescents: An eight-year longitudinal study. *Child and Adolescent Mental Health*, *27*(1), 22–29. https://doi.org/10.1111/camh.12521

Science Media Centre. (2022, May 16). *Emissions Reduction Plan—Expert Reaction*. https://www.sciencemediacentre.co.nz/2022/05/16/emissions-reduction-plan-expert-reaction/

Scott, D. (2010). *Education, Epistemology and Critical Realism*. Routledge. https://doi.org/10.4324/9780203883099

SCRIPPS. (2023). *Carbon dioxide concentration at Mauna Loa Observatory*. Scripps Institution of Oceanography at UC San Diego. https://keelingcurve.ucsd.edu/

Selby, D. (2014). Education for Sustainable Contraction as Appropriate Response to Global Heating. In editor Larry Bencze & editor Steve Alsop (Eds.), *Activist Science and Technology Education* (1st ed. 2014.., pp. 165–182). Springer Netherlands. https://doi.org/10.1007/978-94-007-4360-1

Sellers, W., & Gough, N. (2010). Sharing outsider thinking: Thinking (differently) with Deleuze in educational philosophy and curriculum inquiry. *International Journal of Qualitative Studies in Education*, *23*(5), 589–614. https://doi.org/10.1080/09518398.2010.500631

Semetsky, I. (2009). Deleuze as a Philosopher of Education: Affective Knowledge/Effective Learning. *The European Legacy*, *14*(4), 443–456. https://doi.org/10.1080/10848770902999534

Sharov, A., & Tønnessen, M. (2021). *Semiotic Agency: Science beyond Mechanism* (Vol. 25). Springer International Publishing. https://doi.org/10.1007/978-3-030-89484-9

Sharp, D. (1995). *Who am I, really?: Personality, soul and individuation* (Vol. 67). Inner City Books.

Sherman, M. (2023, July 21). Poll: Country divided on race relations. *1 News*. https://www.1news.co.nz/2023/07/21/poll-country-divided-on-race-relations/

Sherwood, S. C., & Huber, M. (2010). An adaptability limit to climate change due to heat stress. *Proceedings of the National Academy of Sciences*, *107*(21), 9552–9555. https://doi.org/10.1073/pnas.0913352107

Shi, W., Fu, H., Wang, P., Chen, C., & Xiong, J. (2020). #Climatechange vs. #Globalwarming: Characterizing Two Competing Climate Discourses on Twitter with Semantic Network and Temporal Analyses. *International Journal of Environmental Research and Public Health*, *17*(3), Article 3. https://doi.org/10.3390/ijerph17031062

Shields, C. M. (2013). *Transformative Leadership in Education: Equitable Change in an Uncertain and Complex World*. Eye on Education. https://doi.org/10.4324/9780203814406

Shoshitaishvili, B. (2021). From Anthropocene to Noosphere: The Great Acceleration. *Earth's Future*, *9*(2), e2020EF001917. https://doi.org/10.1029/2020EF001917

Sidebottom, K. (2021). *Rhizomes, assemblages and nomad war machines–re-imagining curriculum development for posthuman times*. ProQuest Dissertations Publishing.

Silova, I., Rappleye, J., & Komatsu, H. (2019). Measuring What Really Matters: Education and Large-Scale Assessments in the Time of Climate Crisis. *ECNU Review of Education*, *2*(3), 342–346. https://doi.org/10.1177/2096531119878897

Silva, V. P. da, & Assis, F. V. A. de. (2021). Socio-ecological sustainability and school garden in the early years of elementary school: A systematic literature review. *Journal of Science and Education (JSE)*, *2*(1), Article 1. https://doi.org/10.56003/jse.v2i1.67

Simmonds, N. B. (2009). *Mana Wahine Geographies: Spiritual, Spatial and Embodied Understandings of Papatūānuku* [Thesis, The University of Waikato]. https://researchcommons.waikato.ac.nz/handle/10289/2798

Skipper, A. S. (2020). *Ko Te Kawa Tūpanapana i ngā Hau Tūpua a Tāwhiri-mātea: The validation, revitalisation and enhancement of Māori environment knowledge of weather and climate* [Thesis, The University of Waikato]. https://researchcommons.waikato.ac.nz/handle/10289/13917

Slaven, M., & Heydon, J. (2020). Crisis, deliberation, and Extinction Rebellion. *Critical Studies on Security*, *8*(1), 59–62. https://doi.org/10.1080/21624887.2020.1735831

Smith, A. (2023, October 3). Election 2023: Experts call out Winston Peters over climate change claims. *RNZ*. https://www.rnz.co.nz/news/political/499263/election-2023-experts-call-out-winston-peters-over-climate-change-claims

Smith, B. H. (2005). *Scandalous knowledge: Science, truth and the human*. University Press.

Smith, N., & Katz, C. (2005). Grounding metaphor: Toward a spatialized politics. In M. Keith & S. Pile (Eds.), *Place and the politics of identity* (pp. 67–83). Routledge, Taylor & Francis Group. https://doi.org/10.4324/9780203016695

Snowden, D. J., & Boone, M. E. (2007). A leader's framework for decision making. *Harvard Business Review*, *85*(11), 68. https://www.systemswisdom.com/sites/default/files/Snowdon-and-Boone-A-Leader's-Framework-for-Decision-Making_0.pdf

Soborski, R. (2020). From the End of History to the Populist Turn and Beyond: Ideology's Misfortunes in Globalization Theory and Global Activism. *International Critical Thought*, *0*(0), 1–15. https://doi.org/10.1080/21598282.2020.1783695

Solnit, R. (2022, December 31). Greta Thunberg ends year with one of the greatest tweets in history. *The Guardian*. https://www.theguardian.com/commentisfree/2022/dec/31/greta-thunberg-andrew-tate-tweet

Spajic, L., Behrens, G., Gralak, S., Moseley, G., & Linholm, D. (2019). Beyond tokenism: Meaningful youth engagement in planetary health. *The Lancet Planetary Health*, *3*(9), e373–e375. https://doi.org/10.1016/S2542-5196(19)30172-X

Spector, K. (2015). Meeting Pedagogical Encounters Halfway. *Journal of Adolescent & Adult Literacy*, *58*(6), 447–450. https://doi.org/10.1002/jaal.382

Spindler, F. (2010). Gilles Deleuze: A philosophy of immanence. In J. Bornmark & H. Ruin (Eds.), *Phenomenology and Religion: New Frontiers* (pp. 149–163). Södertörn University. https://www.diva-portal.org/smash/get/diva2:406664/FULLTEXT01.pdf

Spivak, G. C. (2015). Can the subaltern speak? In P. Williams & L. Chrisman (Eds.), *Colonial Discourse and Post-Colonial Theory: A Reader*. Routledge, Taylor & Francis Group.

Spohr, D. (2017). Fake news and ideological polarization: Filter bubbles and selective exposure on social media. *Business Information Review*, *34*(3), 150–160. https://doi.org/10.1177/0266382117722446

St. Pierre, E. A. (2011). Post qualitative research: The critique and the coming after. In *Handbook of qualitative research* (Vol. 4, pp. 611–626). Sage Thousand Oaks, CA.

St. Pierre, E. A. (2017). Deleuze and Guattari's language for new empirical inquiry. *Educational Philosophy and Theory*, *49*(11), 1080–1089. https://doi.org/10.1080/00131857.2016.1151761

St. Pierre, E. A. (2018a). A Brief and Personal History of Post Qualitative Research: Toward "Post Inquiry." *Práxis Educativa*, *13*(3), 1044–1064. https://doi.org/10.5212/PraxEduc.v.13i3.0023

St. Pierre, E. A. (2018b). Writing Post Qualitative Inquiry. *Qualitative Inquiry*, *24*(9), 603–608. https://doi.org/10.1177/1077800417734567

St. Pierre, E. A. (2019). Post Qualitative Inquiry in an Ontology of Immanence. *Qualitative Inquiry*, *25*(1), 3–16. https://doi.org/10.1177/1077800418772634

St. Pierre, E. A. (2021). Post Qualitative Inquiry, the Refusal of Method, and the Risk of the New. *Qualitative Inquiry*, *27*(1), 3–9. https://doi.org/10.1177/1077800419863005

Stapleton, S. R. (2019). A case for climate justice education: American youth connecting to intragenerational climate injustice in Bangladesh. *Environmental Education Research*, *25*(5), 732–750. https://doi.org/10.1080/13504622.2018.1472220

Staufenberg, J. (2019, December 10). Teacher rebellion: How Mr Jones gave up his job to fight the climate crisis. *The Guardian*. https://www.theguardian.com/education/2019/dec/10/teacher-rebellion-gave-up-job-fight-climate-crisis

Steffen, W. (2019). The Anthropocene: Where on Earth are we going? *The Ecological Citizen*, *2*(2). https://www.ecologicalcitizen.net/pdfs/v02n2-02.pdf

Steffen, W. (2022). The Earth System, the Great Acceleration and the Anthropocene. In S. J. Williams & R. Taylor (Eds.), *Sustainability and the New Economics: Synthesising Ecological Economics and Modern Monetary Theory* (pp. 15–32). Springer International Publishing. https://doi.org/10.1007/978-3-030-78795-0_2

Steffen, W., Rockström, J., Richardson, K., Lenton, T. M., Folke, C., Liverman, D., Summerhayes, C. P., Barnosky, A. D., Cornell, S. E., Crucifix, M., Donges, J. F., Fetzer, I., Lade, S. J., Scheffer, M., Winkelmann, R., & Schellnhuber, H. J. (2018). Trajectories of the Earth System in the Anthropocene. *Proceedings of the National Academy of Sciences*, *115*(33), 8252–8259. https://doi.org/10.1073/pnas.1810141115

Stein, S. (2019). The ethical and ecological limits of sustainability: A decolonial approach to climate change in higher education. *Australian Journal of Environmental Education*, *35*(3), 198–212. https://doi.org/10.1017/aee.2019.17

Stephenson, J. (2020, April 20). Covid-19 has nothing on what's coming. *Newsroom*. https://www.newsroom.co.nz/ideasroom/2020/04/20/1133127?slug=covid-19-has-nothing-on-whats-coming

Stevenson, K. T., King, T. L., Selm, K. R., Peterson, M. N., & Monroe, M. C. (2018). Framing climate change communication to prompt individual and collective action among adolescents from agricultural communities. *Environmental Education Research*, *24*(3), 365–377. https://doi.org/10.1080/13504622.2017.1318114

Stewart, G. T. (2022a). Mātauranga Māori: A philosophy from Aotearoa. *Journal of the Royal Society of New Zealand*, *52*(1), 18–24. https://doi.org/10.1080/03036758.2020.1779757

Stewart, G. T. (2022b). Mātauranga Māori and secondary science teaching: 2022. *Teachers' Work*, *19*(2), Article 2. https://doi.org/10.24135/teacherswork.v19i2.359

Stone, J., & Fernandez, N. C. (2008). To Practice What We Preach: The Use of Hypocrisy and Cognitive Dissonance to Motivate Behavior Change. *Social and Personality Psychology Compass*, *2*(2), 1024–1051. https://doi.org/10.1111/j.1751-9004.2008.00088.x

Stone, L. (2021). Youth power—youth movements: Myth, activism, and democracy. *Ethics and Education*, *16*(2), 249–261. https://doi.org/10.1080/17449642.2021.1896641

Strom, K. J. (2017). *Becoming-Teacher A Rhizomatic Look at First-Year Teaching* (1st ed. 2017.). SensePublishers. https://doi.org/10.1007/978-94-6300-872-3

Swart, J. (2023). Tactics of news literacy: How young people access, evaluate, and engage with news on social media. *New Media & Society*, *25*(3), 505–521. https://doi.org/10.1177/14614448211011447

Swim, J. K., & Fraser, J. (2013). Fostering Hope in Climate Change Educators. *Journal of Museum Education*, *38*(3), 286–297. https://doi.org/10.1080/10598650.2013.11510781

Swinburn, B., Mackay, S., & Te Morenga, L. (2023). *Expanding Ka Ora, Ka Ako is 'bread and butter' action to alleviate the cost-of-healthy-food crisis*. https://ourarchive.otago.ac.nz/handle/10523/15265

Taguchi, H. L. (2012). A diffractive and Deleuzian approach to analysing interview data. *Feminist Theory*, *13*(3), 265–281. https://doi.org/10.1177/1464700112456001

Taylor, C. A. (2018). Each Intra-Action Matters: Towards a Posthuman Ethics for Enlarging Response-ability in Higher Education Pedagogy Practice-ings. In R. Braidotti, V. Bozalek, T. Shefer, & M. Zembylas (Eds.), *Socially Just Pedagogies: Posthumanist, Feminist and Materialist Perspectives in Higher Education*. Bloomsbury Publishing Plc, Bloomsbury Academic.

Taylor, D. (2023). Climate anxiety, fatalism and the capacity to act. In C. Watkin & O. Davis (Eds.), *New interdisciplinary perspectives on and beyond autonomy*. Taylor & Francis. https://doi.org/10.4324/9781003331780-13

The Lancet. (2021). Moving the Overton window. *The Lancet Planetary Health*, *5*(11), e751. https://doi.org/10.1016/S2542-5196(21)00293-X

Thompson, R., & McIlnay, M. (2019). *Nobody Wants to Read Anymore! Using a Multimodal Approach to Make Literature Engaging*. *7*(1).

Thornton, S., Graham, M., & Burgh, G. (2019). Reflecting on place: Environmental education as decolonisation. *Australian Journal of Environmental Education*, *35*(3), 239–249. https://doi.org/10.1017/aee.2019.31

Thornton, S., Graham, M., & Burgh, G. (2020). Reflecting on place: Environmental education as decolonisation. *Australian Journal of Environmental Education*, 1–11. https://doi.org/10.1017/aee.2019.31

Thunberg, G. (2019). *No One Is Too Small to Make a Difference*. Penguin Books.

Tiller, Ni. (2022). From Debunking to Prebunking: How Skeptical Activism Must Evolve to Meet the Growing Anti-Science Threat. *Skeptical Inquirer*, *46*(5). https://skepticalinquirer.org/2022/08/from-debunking-to-prebunking-how-skeptical-activism-must-evolve-to-meet-the-growing-anti-science-threat/

Tillmanns, T., Holland, C., Lorenzi, F., & McDonagh, P. (2014). Interplay of Rhizome and Education for Sustainable Development. *Journal of Teacher Education for Sustainability*, *16*(2), 13. https://doi.org/10.2478/jtes-2014-0008

Treen, K. M. d'I., Williams, H. T. P., & O'Neill, S. J. (2020). Online misinformation about climate change. *WIREs Climate Change*, *11*(5), e665. https://doi.org/10.1002/wcc.665

Trevors, G. J., Muis, K. R., Pekrun, R., Sinatra, G. M., & Winne, P. H. (2016). Identity and Epistemic Emotions During Knowledge Revision: A Potential Account for the Backfire Effect. *Discourse Processes*, *53*(5–6), 339–370. https://doi.org/10.1080/0163853X.2015.1136507

Tuhiwai Smith, L., Maxwell, T. K., Puke, H., & Temara, P. (2016). Feature Article: Indigenous Knowledge, Methodology and Mayhem: What is the Role of Methodology in Producing Indigenous Insights? A Discussion From Mātauranga Māori. *Knowledge Cultures*, *4*(03), 131–156. https://www.ceeol.com/search/article-detail?id=411005

Twenge, J. M., Martin, G. N., & Spitzberg, B. H. (2019). Trends in U.S. Adolescents' media use, 1976–2016: The rise of digital media, the decline of TV, and the (near) demise of print. *Psychology of Popular Media Culture*, *8*(4), 329–345. https://doi.org/10.1037/ppm0000203

UNESCO. (1975). *The Belgrade Charter: A framework for environmental education*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000017772

United Nations. (2015). 4. Quality Education. *United Nations Sustainable Development*. https://www.un.org/sustainabledevelopment/education/

United Nations. (2021). *Climate Change 'Biggest Threat Modern Humans Have Ever Faced', World-Renowned Naturalist Tells Security Council, Calls for Greater Global Cooperation*. United Nations Security Council. https://press.un.org/en/2021/sc14445.doc.htm

Vague, C. J. (2022). *Coming Home: Reclaiming My Māori Identity*. https://hdl.handle.net/10292/15757

Van der Wielen, J. (2018). Living the intensive order: Common sense and schizophrenia in Deleuze and Guattari. *Nursing Philosophy*, *19*(4), e12226. https://doi.org/10.1111/nup.12226

Veldman, R. G. (2019). *The Gospel of Climate Skepticism: Why Evangelical Christians Oppose Action on Climate Change*. Univ of California Press.

Verlie, B. (2017). Rethinking Climate Education: Climate as Entanglement. *Educational Studies*, *53*(6), 560–572. https://doi.org/10.1080/00131946.2017.1357555

Verlie, B. (2019). *Affective entanglements: Learning to live-with climate change* [PhD Thesis, Monash]. https://figshare.com/articles/Affective_entanglements_Learning_to_live-with_climate_change/7901675

Verlie, B., & CCR 15. (2018). From action to intra-action? Agency, identity and 'goals' in a relational approach to climate change education. *Environmental Education Research*, 1–15. https://doi.org/10.1080/13504622.2018.1497147

Vesterinen, V.-M., Tolppanen, S., & Aksela, M. (2016). Toward citizenship science education: What students do to make the world a better place? *International Journal of Science Education*, *38*(1), 30–50. https://doi.org/10.1080/09500693.2015.1125035

Vogel, M. M., Zscheischler, J., Wartenburger, R., Dee, D., & Seneviratne, S. I. (2019). Concurrent 2018 Hot Extremes Across Northern Hemisphere Due to Human-Induced Climate Change. *Earth's Future*, *7*(7), 692–703. https://doi.org/10.1029/2019EF001189

von Glasersfeld, E. (2013). *Radical Constructivism*. Taylor and Francis.

Vu, C. (2018). New Materialist Auto-ethicoethnography: Agential-realist Authenticity And Objectivity In Intimate Scholarship. In K. Strom, T. Mills, & A. Ovens, *Decentering the Researcher in Intimate Scholarship: Critical Posthuman Methodological Perspectives in Education* (pp. 92–108). Emerald Publishing Limited. http://ebookcentral.proquest.com/lib/waikato/detail.action?docID=5543342

Waitoki, W. (2022). In defence of mātauranga Māori: A response to the "seven academics." *The New Zealand Medical Journal (Online)*, *135*(1552), 139–142.

Walker, J. (2023). Learning together out of climate change denial. *New Directions for Adult and Continuing Education*, *2023*(178), 27–40. https://doi.org/10.1002/ace.20496

Wallace, A. R. (1890). *The Malay Archipelago*. MacMillan And Co. http://wallace-online.org/converted/pdf/1890_MalayArchipelago_S715[10th].pdf

Wannan, O. (2023, September 12). *Stuff survey reveals wide gaps in climate plans between National, Labour's likely coalition partners*. Stuff. https://www.stuff.co.nz/environment/climate-news/132814800/stuff-survey-reveals-wide-gaps-in-climate-plans-between-national-labours-likely-coalition-partners

Watkins, T. (2023, October 22). ACT's Treaty referendum is a poisoned chalice for the new government. *The Post*. https://www.thepost.co.nz/a/politics/350096309/acts-treaty-referendum-poisoned-chalice-new-government

Watts, J. (2019, April 23). The Greta Thunberg effect: At last, MPs focus on climate change. *The Guardian*. https://www.theguardian.com/environment/2019/apr/23/greta-thunberg

Webb, C. (2017). *Working paper 2017/03–Key graphs on poverty in New Zealand: A compilation*. McGuinness Institute.

Webb, J., Schirato, T., & Danaher, G. (2020). *Understanding Bourdieu*. Routledge.

Weil, S. (2000). *Simone Weil, an anthology*. Grove Press.

Weinbaum, D. R. (2015). Complexity and the Philosophy of Becoming. *Foundations of Science*, *20*(3), 283–322. https://doi.org/10.1007/s10699-014-9370-2

Westheimer, J., & Kahne, J. (2003). What kind of citizen? Political choices and educational goals. *Encounters in Theory and History of Education*, *4*. https://doi.org/10.24908/eoe-ese-rse.v4i0.658

Westheimer, J., & Kahne, J. (2007). The Limits of Efficacy: Educating Citizens for a Democratic Society. In B. C. Rubin & J. Giarelli (Eds.), *Civic Education for Diverse Citizens in Global Times*. Routledge.

White, P. J., Ferguson, J. P., Smith, N. O., & Carre, H. O. (2021). School strikers enacting politics for climate justice: Daring to think differently about education. *Australian Journal of Environmental Education*, 1–14. https://doi.org/10.1017/aee.2021.24

Whitehouse, H. (2021). Young people responding to the Anthropocene: Re-considering active citizenship in a new epoch. *Social Educator*, *33*(2), 18–25. https://doi.org/10.3316/aeipt.209415

Whyte, K. (2017). Indigenous climate change studies: Indigenizing futures, decolonizing the Anthropocene. *English Language Notes*, *55*(1), 153–162. https://www.muse.jhu.edu/article/711473

Whyte, K. (2018). Indigenous science (fiction) for the Anthropocene: Ancestral dystopias and fantasies of climate change crises. *Environment and Planning E: Nature and Space*, *1*(1–2), 224–242. https://doi.org/10.1177/2514848618777621

Whyte, K. (2021). Indigenous Realism and Climate Change. In L. Badia, M. Cetinic, & J. Diamanti (Eds.), *Climate realism: The aesthetics of weather and atmosphere in the Anthropocene*. Routledge, Taylor & Francis Group.

Wildcat, D. R. (2009). *Red alert!: Saving the planet with indigenous knowledge*. Fulcrum.

Wilks, J., Turner, A., & Shipway, B. (2019). The Risky Socioecological Learner. In A. Cutter-Mackenzie-Knowles, A. Lasczik, J. Wilks, M. Logan, A. Turner, & W. Boyd (Eds.), *Touchstones for Deterritorializing Socioecological Learning: The Anthropocene, Posthumanism and Common Worlds As Creative Milieux* (pp. 75–97). Springer International Publishing AG. https://doi.org/10.1007/978-3-030-12212-6

Williams, D., & Brown, J. (2013). *Learning gardens and sustainability education: Bringing life to schools and schools to life*. Routledge.

Wilson, N., Chambers, T., Prickett, M., Broadbent, A., & Kerr, J. (2023). *Water infrastructure failures from Cyclone Gabrielle show low resilience to climate change*. https://ourarchive.otago.ac.nz/handle/10523/15686

Wolfram, S. (2019). *Cellular Automata And Complexity: Collected Papers*. CRC Press. https://doi.org/10.1201/9780429494093

Woodfield, A., & Gunby, P. (2003). The Marketization of New Zealand Schools: Assessing Fiske and Ladd. *Journal of Economic Literature*, *41*(3), 863–884. https://doi.org/10.1257/002205103322436214

Wrigley, E. A. (2013). Energy and the English Industrial Revolution. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *371*(1986), 20110568. https://doi.org/10.1098/rsta.2011.0568

Wunderling, N., Winkelmann, R., Rockström, J., Loriani, S., Armstrong McKay, D. I., Ritchie, P. D. L., Sakschewski, B., & Donges, J. F. (2023). Global warming overshoots increase risks of climate tipping cascades in a network model. *Nature Climate Change*, *13*(1), Article 1. https://doi.org/10.1038/s41558-022-01545-9

Yoon, N., & Rata, E. (2018). New Zealand's national education assessment system: Education or populism. *Pacific-Asian Education*, *30*, 65–80.

Young, J. (2019). *Fuelling dissension: Coal and coal mining in 21st century New Zealand*. Triple Helix Resources Ltd.

Zaleha, B. D., & Szasz, A. (2015). Why conservative Christians don't believe in climate change. *Bulletin of the Atomic Scientists*, *71*(5), 19–30. https://doi.org/10.1177/0096340215599789

Zeh, H. D. (1970). On the interpretation of measurement in quantum theory. *Foundations of Physics*, *1*(1), 69–76. https://doi.org/10.1007/BF00708656

Zembylas, M. (2017). The contribution of the ontological turn in education: Some methodological and political implications. *Educational Philosophy and Theory*, *49*(14), 1401–1414. https://doi.org/10.1080/00131857.2017.1309636

Zizek, S. (2011). *Living in the end times*. Verso Books.

Zurek, W. H. (1994). Decoherence and the Existential Interpretation of Quantum Theory, or "No Information Without Representation". In P. Grassberger & J.-P. Nadal (Eds.), *From Statistical Physics to Statistical Inference and Back* (pp. 341–350). Springer Netherlands. https://doi.org/10.1007/978-94-011-1068-6_23

Zurek, W. H. (2003). Decoherence, einselection, and the quantum origins of the classical. *Reviews of Modern Physics*, *75*(3), 715–775. https://doi.org/10.1103/RevModPhys.75.715

Zurek, W. H. (2009). Quantum Darwinism. *Nature Physics*, *5*(3), 181–188. http://dx.doi.org.ezproxy.waikato.ac.nz/10.1038/nphys1202

Zurek, W. H. (2018). Quantum theory of the classical: Quantum jumps, Born's Rule and objective classical reality via quantum Darwinism. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *376*(2123), 20180107. https://doi.org/10.1098/rsta.2018.0107

Zurek, W. H. (2021). Emergence of the Classical from within the Quantum Universe. *arXiv:2107.03378 [Quant-Ph]*. http://arxiv.org/abs/2107.03378

APPENDIX A – ETHICS APPROVAL

This research was approved by the University of Waikato Faculty of Education Ethics Committee on October 7th, 2020, approval number FEDU065/20

APPENDIX B – COMMUNICATIONS WITH THE PARTICIPANTS

Initial Social Media message, used to attract participants on teacher Facebook groups in Aotearoa.

I am looking for teachers to participate in my Climate Education PhD research:

My name is Thomas Everth. I am a PhD candidate at the University of Waikato and am looking for teachers who would like to participate in a study on 'Climate Activist Teachers'.

I am looking for teachers who teach at high school level or are involved in teacher education in a tertiary institution, who would describe themselves as actively concerned about climate change and climate change education and are interested in participating in an exchange of their experiences and ideas with me in three to four Zoom interviews over the course of about 12 months from 2020 to 2021.

If you are interested to know more, please private message me with your email address and I will forward you further information about my research project. This project has been approved by the University of Waikato Faculty of Education Ethics Committee on October 7th, 2020, approval number FEDU065/20

Participant Invitation, sent after a participants made a first contact.

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato
Te Kura Toi Tangata School of Education

Thomas Everth
School of Education
University of Waikato
Gate 1, Knighton Road
Hamilton, 3240

Re: Invitation to participate in a PhD research project on 'Climate Activist Teachers'

Dear Colleague

My name is Thomas Everth. I am a PhD candidate at the School of Education, University of Waikato, have a Master's Degree in Physics, and taught Science and Mathematics at high school level in New Zealand. Climate Change is emerging as the most pressing global issue of our time, and education has a crucial role to play in promoting the transition of society to a sustainable net-zero emissions future. In this transition, teachers are finding themselves in an essential role as mitigators between the futures we could have and the past paradigms from which we operate. I am therefore kindly inviting you to take apart in my PhD research project entitled:

Teacher identity, activism, and empowerment: Entanglements with Climate in Aotearoa New Zealand

For participation in this study, I am looking for 'Climate Activist Teachers' who:

- Teach in New Zealand in the setting of a high-school or area-school and predominantly in the senior years, year 11 to year 13, or in roles in teacher education at the tertiary level.
- Believe that climate change poses a fundamental threat to the future of humanity and the planetary ecosystems as a whole.
- Believe that education has a crucial role to play in mitigating the climate crisis.
- Contribute proactively to climate change education at a school, community or national level or wish to do so.
- Are willing to participate in three to four interviews via Zoom throughout 2021.

I have attached a 'Participant information sheet' with my contact details and further information about the project. If you think you are a match for my participant selection criteria and are interested in participating, then please complete, sign, and return the enclosed consent form to me, preferably by email as a scanned PDF document if possible.

This project has been approved by the University of Waikato Faculty of Education Ethics Committee on October 7th, 2020, approval number FEDU065/20

Thank you for considering to participate in this research. I look forward to hearing from you soon.

Best regards,

Thomas Everth

Participant Information Sheet.

This document was sent to teachers who confirmed their interest in participating in the research:

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato
Te Kura Toi Tangata School of Education

Participant Information Sheet

Study Title:	*Teacher identity, activism, and empowerment: Entanglements with Climate in Aotearoa New Zealand*	
Researcher:	Thomas Everth	Contact: 0275 947133, thomas.everth@gmail.com
Supervisors:	Dr Chris Eames	Contact: chris.eames@waikato.ac.nz
	Dr Laura Gurney	Contact: laura.gurney@waikato.ac.nz

What is the purpose of this study?

- I am interested in collecting the stories, ideas, concerns, successes, hopes, and struggles of the lived experience of 'climate activist teachers', who teach at high school level or in teacher education at tertiary level, who believe that education has a key role to play, and who have a desire to contribute society's transformation to a sustainable zero-carbon future through education. The study will take an ethnographic approach and involves following a group of about 10 to 15 participants over the course of about one year via regular online interviews using the Zoom platform.

If you agree to participate in this study, your participation would involve:

- Participating in a series of three to four Zoom (Video and Audio) interviews with me over the course of the year 2021. These interviews would not exceed one hour each and will consist of either unstructured or semi-structured interviews. These interviews will take part at dates and times that are convenient for you, and you will be given questions or themes for the interviews ahead of time.
- I kindly request your permission to record the interviews (voice and video) using the Zoom recording feature. The interviews will be transcribed and analysed as part of my research project. You will receive a copy of the transcript, once it is available. This is to ensure that the transcript is accurate and that you can co-construct the final transcript of the interview if you so wish. You will be able to request deletions or edits to the transcripts for 14 days after the receipt of the transcript. After that time, the transcript will become part of the research.
- At any time during the interviews, you can request the recording to be stopped, and you can leave the interviews at any time if you wish. You may also decline to respond to any of the interview questions.
- I may invite you to share additional material or artefacts of your climate activist or climate education work for the purpose of analysis for this research (e.g. photos, video, writings). This is entirely optional and voluntary. You maintain ownership of all shared materials.

What are the possible benefits of this study for you?

- During the study, you will be able to voice your stories, ideas, concerns, successes, hopes, and struggles of being a climate activist teacher.
- Your reflections can form part of your professional development.

- Common themes evolving from the research will be shared during the ensuing semi-structured interviews, and you will receive links to any published research as well as the final thesis.
- You will contribute to climate change education, the promotion of teacher agency, and teacher education and professional development.

Confidentiality and anonymity

- Any data that you provide will be used anonymously, and pseudonyms will be used so that your identity remains confidential with regards to all contributions that you privately shared with the researcher during this research. Neither your name nor your place of work will be revealed in any of the publications derived from this research.
- While every effort will be made to protect your anonymity, this cannot be guaranteed. New Zealand is a small country, and others might deduce your identity without any fault of the researcher.

What happens if you change your mind?

- Participation in this study is entirely voluntary. You have the right not to answer any questions for any reason or decline to participate in further interviews. You may stop your participation at any time without reason. You also may ask at any time that the Zoom recording device be turned off during the interviews.
- You have the right to amend the interview transcripts for up to 14 days after you have been presented with the transcripts for verification. After that time, the data will become part of the research and cannot be withdrawn to ensure that the integrity and consistency of the research are maintained.

Outcomes and Findings

- You will receive an abbreviated summary of the findings via email at the conclusion of this research project.
- Findings from this research will be published in the form of national or international journals or presented at conferences. You will be advised if publications or research papers become available that are based on this research and provided with a link to these papers.
- The final findings will be published in the form of a PhD thesis. The final thesis will be available electronically at the University of Waikato's Research Commons, and you will be notified when it is available there.
- To compile a compelling narrative of climate activist teachers, I may endeavour to create a narrated video collage of significant segments of the interviews as part of the possible outcomes of this research. If such a video collage was generated, then you will be asked for your explicit permission to have selected segments of your interviews included, and you may decline this permission for any reason, either for all or for parts of the selected segments. A separate permission form for the inclusion of material pertaining to you in such a video collage will be sent to you in case such a video collage was planned.

Who do you contact for more information if you have concerns?

If you have any question or concerns, please contact me. Thomas Everth, mobile 0275 947133, email: thomas.everth@gmail.com. If you have any concerns or complaints about this study that you are unable to resolve by speaking with me directly, please contact my research supervisors (see above).

This project has been approved by the University of Waikato Faculty of Education Ethics Committee on October 7th, 2020, approval number FEDU065/20

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato
Te Kura Toi Tangata School of Education

Participant Consent and Information Form

[A completed copy of this form should be retained by both the participant and the researcher]

Study Title: Teacher identity, activism, and empowerment: Entanglements with Climate in Aotearoa New Zealand

Researcher: Thomas Everth Contact: 0275 947133, thomas.everth@gmail.com

Name of participant: _____

Contact details: Email: _____

Mobile (optional): _____

Place of work: _____

Position/Subjects: _____

Year levels taught: ☐Y7-10 ☐ Y11 ☐ Y12 ☐ Y13 ☐ Tertiary

Gender: ☐ Female ☐ Male ☐ Not specified

Age Group: ☐ 20-30 ☐ 31-40 ☐ 41-50 ☐ > 50 ☐ Not Specified

By signing this consent form, I confirm that…

- I agree to participate in this study.
- I agree to participate in the Zoom online interviews during this research at a time suitable to me.
- I agree that the interviews will be digitally recorded (voice and video).
- I have received and read the *Participant Information Sheet* describing the research project. Any questions that I have had regarding the project have been answered to my satisfaction. I understand that I can ask further questions at any time.
- I understand that my participation in this study is voluntary. I understand that I can, at any time and without reasons, withdraw from the study, up to and until each of the final interview transcripts is verified by me, latest 14 days after the receipt of a transcript.
- I understand that I can withdraw or amend any information in the interview transcripts within 14 days of the receipts of the transcripts. I understand that after these 14 days, the transcript becomes part of the research.
- I understand that I do not have to answer any questions during any of the interviews. I understand that I can stop interviews at any time, and I can also ask to stop the recording of the interviews at any time.
- I understand that when I sign this consent form, I will retain ownership of the interviews or any material of artefacts I have shared, but I give consent to the researcher to use and analyse the data collected or the material shared for the purpose of the research project.

Anonymity and Confidentiality

- I understand that the researcher will refer to my contributions under a pseudonym in the research, and the researcher will not identify me or my place of work in any of the publications. I understand that while all care will be given, this anonymity cannot be guaranteed. New Zealand is a small country, and there remains a risk that my participation in this research may be deduced without the fault of the researcher by others.

Video Collage of Interview Segments

- I understand that the researcher may wish to produce a narrated video collage of important segments of interviews collected during this research. In case any interview segments of interviews with me are intended by the researcher for use in such a video collage, the researcher will send me a copy of the recording of these segments and a request for permission with a separate permission form for the inclusion of the selected segments in the video collage. I will have the right to withdraw any or all of the selected segments from inclusion without reason.

University Approval

- I understand that this project has been approved by the University of Waikato Faculty of Education Ethics Committee on October 7th, 2020, approval number FEDU065/20 and the project supervisors Dr Chris Eames or Dr Laura Gurney may be contacted in case of any concerns about the conduct of this project.

Participant Full Name: _____

Signature: _____

Date: _____

Email set to invite participants to the first unstructured interview.

Dear ...,

You have been selected as a participant of my study on Climate Activist Teachers because of your stated interest in participating in this research, your interest in climate change and your active engagement towards climate change education.

My research centres on the lived experience of Climate Activist Teachers in our time.

My first official research interview with you is unstructured. In this interview, I will simply give you the "microphone" for a form free talk, where I would like you to speak your mind freely about your experiences as an educator generally and in the educational institution where you work with respect to the climate emergency. You may also wish to comment on how the climate emergency affects you in your personal life. You may wish to comment on working with your students with respect to the climate emergency as well as the community of colleagues, parents and caregivers, and the wider community. You may wish to voice your hopes, your ideas or your concerns.

So in the first interview, I will simply give you time, up to one hour, to share your lived experience as a teacher and a private citizen on the broad topic of the research.

Please let me know when a convenient time would be for you to engage with this interview.

Email sent to invite the participants to the Assemblage drawing activity.

Drawing your school and yourself as assemblages

Dear participants in my research

I am using assemblage theory as a theoretical lens to analyse the data you have provided for my research. As part of this, I construct assemblage diagrams that, seen through the lens of your data, depict the school situation in which you find yourself and what affects seem to be important in your particular view. But I thought it might be an excellent idea to ask you to draw such a diagram yourself.

So, therefore, as the next engagement with you, I would like to invite you to make such a sketch or doodle or drawing of two assemblages: Firstly your school and then one of yourself. To explain what I mean by *assemblage*, I have attached a very brief introduction into assemblage theory, which includes further references if you are interested in looking a bit deeper into the concept.

You can make these drawings using pen and paper and then scan these back to me, or you might wish to use PowerPoint or a similar application and email me the result. You might also perhaps want to include a photo of some element of your environment, or artefact, which connects to your experience as a climate activist teacher.

Reading my introduction should suffice to do this, but I will attach the referenced papers for you as PDF documents. Of those attached papers, the Fox and Alldred (2020) paper is perhaps the most helpful and quick to read, followed by Bazzul and Kayumova (2016).

My brief introduction into assemblage theory deliberately stays clear of the context of schools and the climate emergency in order not to taint your ideas with mine before you create these sketches.

After receiving your drawings, I would like to find a suitable time for a follow-up Zoom interview with you to use your drawings as a talking point.

Please feel free to contact me via email if you have any questions regarding the assemblage diagram drawing activity.

Best regards,

Thomas Everth

Attachment sent with instructions for the Assemblage drawing activity.

The referenced papers were attached as PDF documents to this email.

A brief introduction into the theory of assemblages

Assemblage theory was developed by DeLanda (2006) with reference to work by Deleuze and Guattari. It conceptualises the natural and the social world as a web of more or less well defined assemblages in which components are grouped or assembled pragmatically. The components of assemblages are often also assemblages in their own right. The components of assemblages can be human or more than human, material, or conceptual and are often a mixture of different elements. There is an example below of a horticulture business as an assemblage.

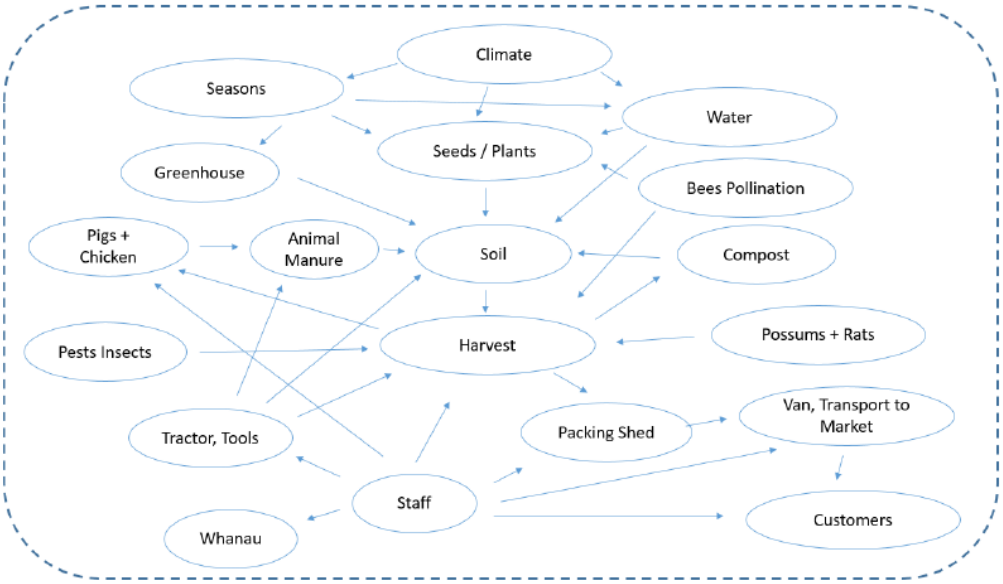
Assemblages generate a dynamic of their own, and their behaviour is not reducible to any of its components, nor can it be predicted from the behaviours of those separate parts. Assemblages establish a *territory,* and the way they internally work is governed by *coding*. Coding comes in the form of written or unwritten rules of behaviour or physical laws that apply to the components of the assemblage. Coding creates cohesion and containment of the components with the assemblage and leads to behaviour that contributes to sustaining the assemblage.

Components within assemblages don't necessarily have a hierarchy, but their organisation emerges pragmatically or through coding (rules) within the assemblages. Assemblages are dynamically changing and adapting. Their level of coding and the definition of their territory (territorialisation) can vary over time and respond to the dynamism of processes, both within and outside of the assemblage.

Assemblages are often represented as drawings or diagrams that show structures and lines of connection such as power between them. They try to highlight the effects that work internally between the components of the assemblage and with things outside (externalities) of its territorial definition.

There is no one "right" way to draw an assemblage illustration, and any particular illustration is always drawn from the specific perspective of the observer.

Here is a very simple example of how the assemblage of a horticulture business might look like.



In this hypothetical horticulture business, *territorialisation* refers obviously to its physical territory, the land it is operating on. But its territory may well extend to a segment of the local market, certain customers over which the business may have some claim as "their customers", its staff and the wider whanau associated with the business, and its suppliers and good-will arrangements with others on which the business may rely. The *coding* of the business would consist of the rules and practices it has established, its know-how, its contracts with staff and others, coding derived from local knowledge, plant knowledge, knowledge about its seasons, its branding and marketing, and the story that the business projects to the community in which it operates.

Interestingly, this business has incorporated "Climate" and climate forecasts into its territory as it considers the climate as a vital element within in its long-term perspective.

The task: Schools and yourself as assemblages:

In this engagement, I would like to invite you to make two drawings: Your school as an assemblage and yourself as an assemblage.

Your school or place of work: I would like you to conceptualise your school or institution of work in the current climate change-affected world as an assemblage, seen from your perspective as a climate activist teacher. What are its important internal components that dominate the school's or institution's inner workings? Does it somehow have the climate emergency internalised in its assemblage, or is this missing? What about the student strike movement? What are the dominant external influences that determine its actions?

Yourself: I would like you to conceptualise yourself in the current climate change-affected world as a climate activist teacher as an assemblage. What are the important internal components within the assemblage that is you? How do you see yourself linked to climate and the climate emergency? What about your students and your family? What are the dominant external influences that determine your actions?

It is entirely up to you how to conceptualise the border or territory around your school or yourself in both these cases. Like coding, territorialisation, the degree to which an assemblage defines and delineates itself from everything else is a variable of the assemblage. Often so-called "lines of flight" are part of assemblage illustrations. They show trajectories, along which change within the assemblage or movement of components out of or into the assemblage happens.

References

Bazzul, J., & Kayumova, S. (2016). Toward a Social Ontology for Science Education: Introducing Deleuze and Guattari's assemblages. *Educational Philosophy & Theory*, *48*(3), 284–299. https://doi.org/10.1080/00131857.2015.1013016

DeLanda, M. (2016). *Assemblage theory*. Edinburgh University Press.

DeLanda, M. (2011). *Assemblage Theory, Society, and Deleuze. 2011*. https://www.youtube.com/watch?v=J-I5e7ixw78&t=2581s

Fox, N. J., & Alldred, P. (2020). Re-assembling climate change policy: Materialism, posthumanism, and the policy assemblage. *The British Journal of Sociology*, *71*(2), 269–283. https://doi.org/10.1111/1468-4446.12734

APPENDIX C – STANDARD INTERVIEW PROTOCOL

This protocol was used in all interviews in this research project.

- Greeting: The participant is greeted and asked how they are and if they are ready to proceed with the interview.

  "Hello ……. How are you today? Thank you very much again for your participation in this research. Is this a good time now to conduct the interview?"

- Confirmation of recording: The participant is reminded that this interview is automatically recorded by the researcher for the purpose of data gathering and transcription.

  "Before we start, I need to remind you that this interview will be recorded, audio and voice, for the purpose of data gathering and transcription. You have the right to ask me to stop the recording at any time. Is this ok?"

- Confirmation that the participation is voluntary and that the participant can stop the interview at any time.

  "I want to remind you that your participation in the interview is voluntary and that you can end this interview at any time without any reason. You do not need to answer any of the questions I may have."

- The interview then proceeds by announcing the format of the interview. The theme of the interview is announced, and the interview proceeds.

  "*We start the interview now. Today's format of the interview is… and the theme of the interview is…."*
  (the interview questions for follow-up interviews will emerge from the data of previous interviews)

- If the participant requests that the recording is stopped, the recording is paused. If the participant agrees later that the recording can be restarted, it is resumed.

- At the end of the interview, the participant is reminded that the transcript will be shared with the participants as soon as it becomes available and that the participants have the right to request corrections or deletions of parts of the transcript for up to 14 days after being given the transcript and the recording.

  "*This concludes today's interview. Thank you again very much for your participation. I will share a copy of this transcript of the interview with you when it becomes available. You then have 14 days to let me know if you want to make any corrections or deletions in the transcript. After that time, the interview data will become part of the body of data in the research.*

APPENDIX D – EXAMPLE OF SUBCODES

Table AD-1

Example of the Subcodes of the "Identity of Teachers" Meso-Level Codes

Code	Comment	References
Identity of Teachers		752
Climate and Sustainability	Statements about climate and sustainability	37
Interconnected issues	Statements about the complexity of interconnected issues	22
Emotional stance	Comments on their emotional stance	403
Negative	Grouping for negative emotions	280
Anger	Grouping for various expressions of anger	72
Anger about global state	Anger about the global state of the world	17
Anger about local issue	Anger about a local issue	12
Anger at government	Anger about the government	9
Anger at industry	Anger about a particular industry	12
Anger at school system	Anger about the school system	22
Fear	Grouping for various expressions of fear	73
Despair	Expressions of despair	7
Doomist	Expressions of coming doom	19
Eco Anxiety	Environmental anxiety	17
Eco Worry	Concerns about the environment	14
Fear for family	Fear for family's future	5
Fear for student future	Fear for students' future	9
Professional fear	Professional fear of job security	1
Frustration	Expressions of Frustration	86
Grief	Expressions of grief	5
Guilt	Expressions of guilt	3
Helplessness	Feeling helpless	11
Overwhelmed	Feeling overwhelmed	27
Hypocritical	Reflections on hypocrisy	6
Loneliness	Feeling lonely	8
Nihilist Fatalist	Fatalism / Nihilism	14
Shame	Feeling ashamed	2
Positive	Grouping for positive emotions	99
Empowered	Sense of empowerment	12
Grateful	Expressions of gratefulness	2
Hope	Feeling hopeful	19

Joy	Expressions of joy	4
Responsibility	Reflections on responsibility	62
Sense of Justice	Comments on justice as emotional reaction	24
Personal Story	Narrative of personal story	296
Beginning teacher	Narratives as a beginning teacher	8
Cross Cultural	Reflections on cross-cultural and bi-cultural themes	15
Faith	Stating matters of faith	1
Family Conflict	Reflecting on a conflict in the family about climate change	8
Family Motivation	Being motivated by the family	3
Indigenous grounding	Feeling grounded in indigenous culture	12
Internationalism	Statements on internationalism	6
Lifestyle choices	Statements on personal lifestyle choices made	47
Sustainable Food	Food choices made due to climate change	8
Love of nature	Expressions of love of nature	9
Ontology Questioning	Reflections on ontology	12
Personal actions	Stories of personal actions	40
Personal History	Narrative about their personal history and life events	72
Political stance	Statements about their political stance	28
Professional Development	Discussions of professional development	19
Science Knowledge	Reflections on science knowledge	15
Showing off	Boasting about personal success	1
Relating to Students	Relating to Students. These participant self-reflections are in addition to the main section on Pedagogy and students.	15
Teacher reward by student action	Getting a sense of reward from students' actions	3
Urge to educate	Expressing the urge to educate students	12

See also Appendix D, table AD-1 for an example of the Subcodes of the "Identity of Teachers" Meso-Level Codes.

shows the branch of "Identity of Teachers" in the coding network with its multiple levels of sub-codes. The other branches of the coding tree are structured in similar ways.