

Article

A Transformative Architectural Pedagogy and Tool for a Time of Converging Crises

Amanda Yates ^{*}, Maibritt Pedersen Zari , Sibyl Bloomfield , Andrew Burgess, Charles Walker, Kathy Waghorn, Priscila Besen , Nick Sargent and Fleur Palmer

Huri Te Ao Hoahoanga School of Future Environments, Te Ara Auaha Faculty Design and Creative Technologies, Te Wānanga Aronui O Tāmaki Makau Rau Auckland University of Technology, Auckland 1010, New Zealand

* Correspondence: amanda.yates@aut.ac.nz

Abstract: The institutional frameworks within which we conceive, design, construct, inhabit and manage our built environments are widely acknowledged to be key factors contributing to converging ecological crises: climate change, biodiversity loss, environmental degradation, and social inequity at a global scale. Yet, our ability to respond to these emergencies remains largely circumscribed by educational and professional agendas inherited from 20th-century Western paradigms. As the crises intensify, there is a compelling case for radical change in the educational and professional structures of the built environment disciplines. This paper presents a work-in-progress examination of an emergent architecture programme at *Te Wānanga Aronui O Tāmaki Makau Rau*/Auckland University of Technology (AUT), Aotearoa New Zealand. The program is within *Huri Te Ao*/the School of Future Environments, a transdisciplinary entity formed in 2020 to integrate research and teaching across Architecture, Built Environment Engineering, and Creative Technologies. The school itself is conceived as a collaborative project to co-create an outward-facing civic research platform for sharing ecologically positive design thinking across diverse communities of practice. The programme foregrounds *mātauranga Māori* (Indigenous ways of knowing), transdisciplinary systems, and regenerative design as regional place-oriented contributions to planetary-scaled transformation. We illustrate and evaluate a specific curriculum change tool, the Living Systems Wellbeing (LSW) Compass. Grounded in *Te Ao Māori* (Māori cosmology and context), the Compass offers a graphic means for students to navigate and integrate ecological relationships at different scales and levels of complexity, as well as affords insights into alternative foundational narratives, positive values, design strategies, and professional practices. This paper identifies four foundational factors for transformative pedagogies. The first factor is the value of a collectively held and clearly articulated vision and focus. The second factor is the capacity and commitment of an academic team that supports and values the vision. Thirdly, the vision needs to meet and acknowledge place-specific knowledges and values. Finally, the pedagogy should have an action research component founded in real-world interactions. While this research-based pedagogy is place-based and specific, we argue that these four factors are transferable to other learning institutions and can support critical pedagogies for social, cultural, and ecological wellbeing.

Keywords: regenerative architecture; architectural education; pedagogy; mauri ora; Indigenous knowledge; system change; socio-ecologically positive design; climate emergency; climate justice; ecological emergency



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1. Introduction

Climate change and biodiversity loss are two major converging crises of our time. Cities are responsible for approximately 38% of global GHG emissions [1]. Urban development also substantially contributes to global habitat loss, fragmentation, and degradation through land-use and land-cover change and pollution arising from the construction and operation of cities. Although urban environments cover only approximately 3% of the

Earth's surface [2], they are a rapidly growing land-cover typology. The ongoing expansion of urban territory, characterised as a state of “planetary urbanism”, displaces living ecologies and established ecosystem relationships, accelerating the current extinction emergency [3]. Built-environment-caused climate change and biodiversity loss are interlinked in a reinforcing destructive feedback cycle [4]. For example, urban-development-driven loss of biodiversity and vegetation reduces global carbon sequestration and drives climate change at local and global scales, while changes to weather patterns, sea levels, and temperatures alter habitats and can destabilise ecosystems. This relationship means that further biodiversity loss drives climate change and vice versa. Because cities are now the primary habitat of humans, it is in the urban built environment where the impacts of climate change and biodiversity loss will be most keenly felt by humans and where adaptation and regeneration measures for human wellbeing must be focused. It is clear that the way cities and buildings are designed, built, operated, and lived in must rapidly change in order to maintain a suitable habitat for humans. Beyond this, built environments must potentially become agents of regeneration of ecosystem and climate health rather than primary causes of damage [5–10]. This shifting of cultural systems—from extractive to regenerative, linear to circular, human-centric to ecological—is the great challenge and opportunity of this time.

In response to these converging drivers and impacts of change, built environment design professionals are increasingly calling for changes in professional and built environment practices [11,12]. In different places and at different scales, individuals and groups are moving from extractive business-as-usual to more ecological approaches [13]. To meet the need for radical changes in practice, the education of the next generations of built environment design professionals must also be critically examined and rapidly transformed [14–16]. So far, the integration of these issues into built environment education has been limited, with a primary focus on energy consumption, efficiency, and operational carbon as key environmental impact indicators. Many architecture schools offer courses on sustainability delivered through lecture-based classes with very little integration with design studios [17]. There is an urgent need for detailed and in-depth ecological design education to be delivered within a fully integrated pedagogical framework so that regenerative design principles can be effectively embedded into all design projects and learning instead of being limited to a few selected courses or electives. In 2021 the Australia-and-New-Zealand-based “Climate Literacy and Action in Architecture Education” survey reported that 95 percent of staff and student respondents described “high” or “very high” levels of concern about climate change and sustainability issues, while the same percentage wanted to see more teaching about climate change in the architecture curriculum. Researchers noted there is great potential in pedagogy, where formal university-based teaching about climate change and sustainability (and including Indigenous knowledge) can empower future practitioners, but that what is required to achieve this is a move to “integrated higher order thinking”. This includes “complex, system-scale awareness and notions of empathy and care” combined with connectivity across knowledge domains and subject areas that are most often held apart in traditional programs [18].

This paper reviews a new architecture programme situated in AUT's *Huri Te Ao* School of Future Environments that cultivates such an awareness and approach. Because the programme is complex, occurring across five years and multiple courses, we focus the discussion on how a “compass” tool supports transformative learning. As part of this review, we conclude with a summary of factors that support and enable the programme's regenerative aspirations. These factors may act as guidelines for other learning institutions seeking to develop more critical or transformative pedagogies. To normalise the use of our Indigenous language in academic contexts, we have not translated *Te Reo Māori* (Indigenous language of Aotearoa/New Zealand) terms within the article body. For clarity, these have been italicised, and a glossary of *Te Reo Māori* terms and words is provided.

1.1. *Te Tiriti o Waitangi/The Treaty of Waitangi*

In *Aotearoa*, any discussion of ecological or environmental frameworks must also actively acknowledge the partnership obligations implicit in *Te Tiriti o Waitangi/The Treaty of Waitangi*, the founding document of New Zealand, signed in 1840 by *Rangatira Māori* and the British Crown [19]. The *Te reo Māori* version of the treaty, signed by most signatories and, importantly, by most *Rangatira Māori*, defines key relationships and responsibilities. These are the recognition and upholding of *Māori Tino Rangatiratanga*, the Crown's freedom to govern, and their responsibility to actively protect Māori interests. The 3 P's of the treaty have since been articulated in legal precedent and are understood as: Partnership underpinned by reciprocity and mutual benefit, this is actioned through access to/right of Participation and the Protection of Māori "just rights", "of property", property interests and importantly of *Rangatiratanga* [20]. The responsibility to uphold this treaty, decolonise built environment education [21], and action responsibilities in ways that are mutually beneficial and mana-enhancing underpins the work discussed in this paper.

1.2. *Huri Te Ao The School of Future Environments*

E hara taku toa, I te toa takitahi, engari he toa taku tini.

My strength is not from myself alone but from the strength of many.

The question of how to accelerate this incipient systemic change was central to the development of a new programme by the founding Head of School, Professor Charles Walker, and two Māori Associate Professors, Fleur Palmer and Amanda Yates. Other contributors to curriculum development and positioning included *Ngā Aho*, the Māori Design Professionals Network in *Aotearoa*, the New Zealand Institute of Architects (NZIA), and a significant number of architectural practices and academics from *Aotearoa*, Australia, and elsewhere. The *Te Reo Māori* name for the school, *Huri Te Ao*, loosely translates as "turning or changing the world". The name takes the school beyond AUT's marketing position as "The university for the changing world". The overall trajectory of the school relies upon interlinked understandings for design practice centred in Indigenous knowledge and social justice, combined with transformative regenerative practice to address the climate and ecological emergencies of the Anthropocene. Thus, we refer to *mātauranga Māori*, the knowledges, and *Te Ao Māori*, the worldviews of *Aotearoa's* Indigenous peoples, "*Tangata Whenua*" or "*Māori*."

Most architecture schools in *Aotearoa* and Australia offer students a choice from a diverse range of individual design studio projects that vary from semester to semester. However, the vision and knowledge invested in these are only rarely communicated beyond the confines of the studio. Such models also tend to reinforce the idea of the architect, architectural academic, or architectural student as individual auteurs rather than as contributors to a collective architectural intelligence [22]. *Huri Te Ao* offers an alternative to this standard model. Instead of a number of small studios, independent student projects, and a range of other taught papers, the programme is organised horizontally and/or vertically around an urban project or design theme each year and in relation to our programme questions. The rationale for this is that as the environmental challenges of 21st-century cities become more complex and more urgent, the creation of generalisable architectural knowledge must necessarily go beyond the scale of what can be achieved by individual students or small studios. It becomes incumbent on architecture schools to foster the infrastructures, methodologies, strategic thinking, and architectural agency required to build integrated academic and professional research agendas at a scale that supports graduates and architects to be both creative and effective in demonstrating the nature and value of their disciplinary knowledge and to effect meaningful change in the built environment. This all-school approach is not intended to be prescriptive or constraining and is open to further evolution, elaboration, or critique at all levels. Rather, the aim is to create a coherent common ground for informed interaction across the whole school and to build, over time, a significant body of more substantive, collectively generated architectural research that can be curated and disseminated across wider public, academic and professional platforms.

Precedents for this type of approach exist. Take, for example, a similar experiment at the University of Technology Sydney [23]. In this way, the programme, its students, tutors, and partners can be seen as co-investigators and co-designers of a large-scale, outward-facing civic research platform capable of meaningfully informing, influencing, and responding to the evolution of our host city.

Historically, the education of an architect has been a highly individualised pursuit, focused on the development of an individual skill set that seldom includes collaboration beyond that of student and professor [24]. The programme actively challenges the normative architect as a singular designer model in favour of an approach where the architect is a facilitator of culturally meaningful and co-designed dialogue and visioning. Here the emphasis is on collective rather than individualistic pedagogies, practices, and actions, with Indigenous ecological knowledge valued as a fundamental platform. The programme is designed to engage respectfully with *Te Tiriti o Waitangi* and facilitate the development of architects who actively become good treaty partners through their practice. The pedagogy emphasises the need for settler/colonial culture to change to better meet Indigenous practices and aspirations for living systems' wellbeing and to regenerate planetary living systems.

The five-year programme (three years of undergraduate study followed by a two-year professionally accredited master's programme) focuses on *mauri ora* and living systems regeneration (see Figure 1, Te Ara Ako map, for an overview of the curriculum design). The programme aims to equip *ākonga* with the ontological, analytical, design, and collaboration skills necessary to contribute to the change from extractive to regenerative systems and paradigms.

The first year of the undergraduate programme focuses on *whakapapa*. *Whakapapa* is described as genealogy, but at its most profound, this is about a more-than-human lineage and foundational understanding of kinship with the non-human world [25,26]. It refers to the complex networks of relations between *tangata* and *te taiao*. We are in dynamic relationships with everything around us, with everything that came before us and everything that is yet to come. *Ākonga* are supported to develop and learn their *pepeha* as a first means of understanding oneself through connection. They design and test simple site-responsive architectures or installations for their own neighbourhoods, engaging with the complexity of contemporary practice, including understanding material *whakapapa*, or life cycles, aspects of weather and impacts of changing climate and local relationships of people to place over time.

The year two curriculum is oriented around *mauri ora*, understood here as the connected vitality of living systems: social, cultural, and ecological. *Ākonga* develop inter-generational housing designs, considering the diverse cultural practices of families in *Aotearoa*, and then more complex multi-programmed environments that integrate living systems to test innovative regenerative practices.

Year three is about *ki tua*, meaning futurity, or the capacity to thrive intergenerationally. Projects focus on complex environments that integrate public, commercial, and housing programmes with regenerative practices integrated into the design of buildings and local environments. These include designing for local zero-carbon energy generation, walkable neighbourhoods, urban agriculture, blue-green infrastructure, and nature-based, architecture-integrated solutions, such as green roofs, constructed wetlands, rain gardens, and swales. An emphasis on projects and actions that have a tangible impact on the world (rather than imaginary projects) is a feature of the third year of study.

This pedagogy is unique in *Aotearoa* in its emphasis on place-based, holistic and regenerative change in designed environments. Rather than focusing on a "problem", the curriculum deliberately focuses on living system wellbeing and, in so doing, enacts necessary cultural change. Socio-technological change is necessary along with a more profound and foundational shift in how contemporary culture understands itself in relation to the planet. The programme aims to resist neo-liberal/neo-colonial paradigms pervasive in academia and in culture more broadly.



Figure 1. Te Ara Ako. Image credit: A. Yates and K. Clarke, 2022.

2. A Regenerative Action Compass as a Pedagogical Change Tool

In this article, we focus on how a transformative action tool, the Living Systems Wellbeing (LSW) or Mauri Ora Compass, enables the programme to implement ecological

regenerative aspirations [27]. The Compass integrates bio-regenerative, nature-positive actions within a matrix of other human-centred actions for place-specific community wellbeing. It supports academics and *ākonga* in navigating a holistic, wellbeing-led ethic and practice of systems change processes. It is an interactive diagram, either printed out as a large format poster or used as a digital file, that supports regenerative strategy and design decisions. It is an analysis and action tool that outlines key necessary transitions in built environment structure and systems, and it is a circular set of actions that *ākonga* can work with to activate change in their thinking and designing (Figure 2).

The Compass diagrams both the local and the global-planetary scale. It visualises local actions for environmental regeneration in the context of planetary wellbeing. In so doing, the Compass acts as an ongoing visual reminder that our local actions have global effects, and that we live within an intricately connected life-web. The local circle is made up of six transition areas clustered into two groups, where one group encircles the other. The encircling group represents the three big E's of transition: Ecosystem regeneration, circular bio-Economy, and zero-carbon Energy. The second interior cluster includes local access and mobility systems, built infrastructures, and community systems. These are resourced by the encircling cluster. With six transition areas and multiple actions, and a context of planetary wellbeing, the diagram, like our designed environments, is complex. Simply though, the diagram focuses on the transition to ecological regeneration.

Cultures shift over time, but clarity of analysis and purpose is necessary for the foundational changes required now. At its core, the Compass signals a simple but profound change, centring contemporary cultural narratives on ecological connection and an ethic of care. This is a profound change for settler cultures, a shift in how to live and act. The Compass is a cultural change tool for some because it nudges participants towards a focus on *mauri ora*, or social, cultural, and ecological wellbeing. As a *Te Tiriti* partnership tool, the Compass has two settings: it is *ngā tohu mauri ora*, a navigator for social-ecological wellbeing when co-created by or with Māori, and it is a living Systems Wellbeing Compass when co-created by non-Māori. Each tool supports ecological change in a way that actively requires structural and systemic shifts in settler culture.

The Compass is one outcome of a National Science Challenge urban wellbeing programme led by *Hoahoanga* researcher Amanda Yates. Developed as a community-led system change tool, the Compass has been taken up by a range of different communities of change, including by *mana whenua* governance group *Te Tatau o Te Arawa*, who have developed a Housing and Neighbourhood Mauri Ora Compass, and by regenerative building industry social enterprise *Whakaora*, which has co-created a Living Systems Wellbeing Compass. During co-creation sessions, communities actively create their own Compasses for change from a “pick and mix” kit-of-parts. Using sticky notes or felt pens on a blank kit-set, Compass poster participants pinpoint local actions for change. Through this collaborative exchange and through discussing, diagramming, arguing, and strategically meeting across differences, communities can specify transformative actions that meet the cultures, ecologies, and future aspirations of their place.

The current *Hoahoanga* Compass was co-created in a series of workshops with *Hoahoanga* academics and with engagement from *ākonga* as part of a wider curriculum development process. The Compass brings well-understood built-environment actions and paradigms (for example, the 15 min city, the 3:30:300 tree rule, and sponge city concepts [28–30]) into play in relation to transformative approaches, such as living systems regeneration and the Māori Indigenous concepts of *mauri* or wellbeing. The Ara Ako map (Figure 1) shows some key points in the curriculum where the Compass is engaged, though, in practice, it is often used in the programme in more tactical ways to tune thinking around these concepts when opportunities organically emerge.

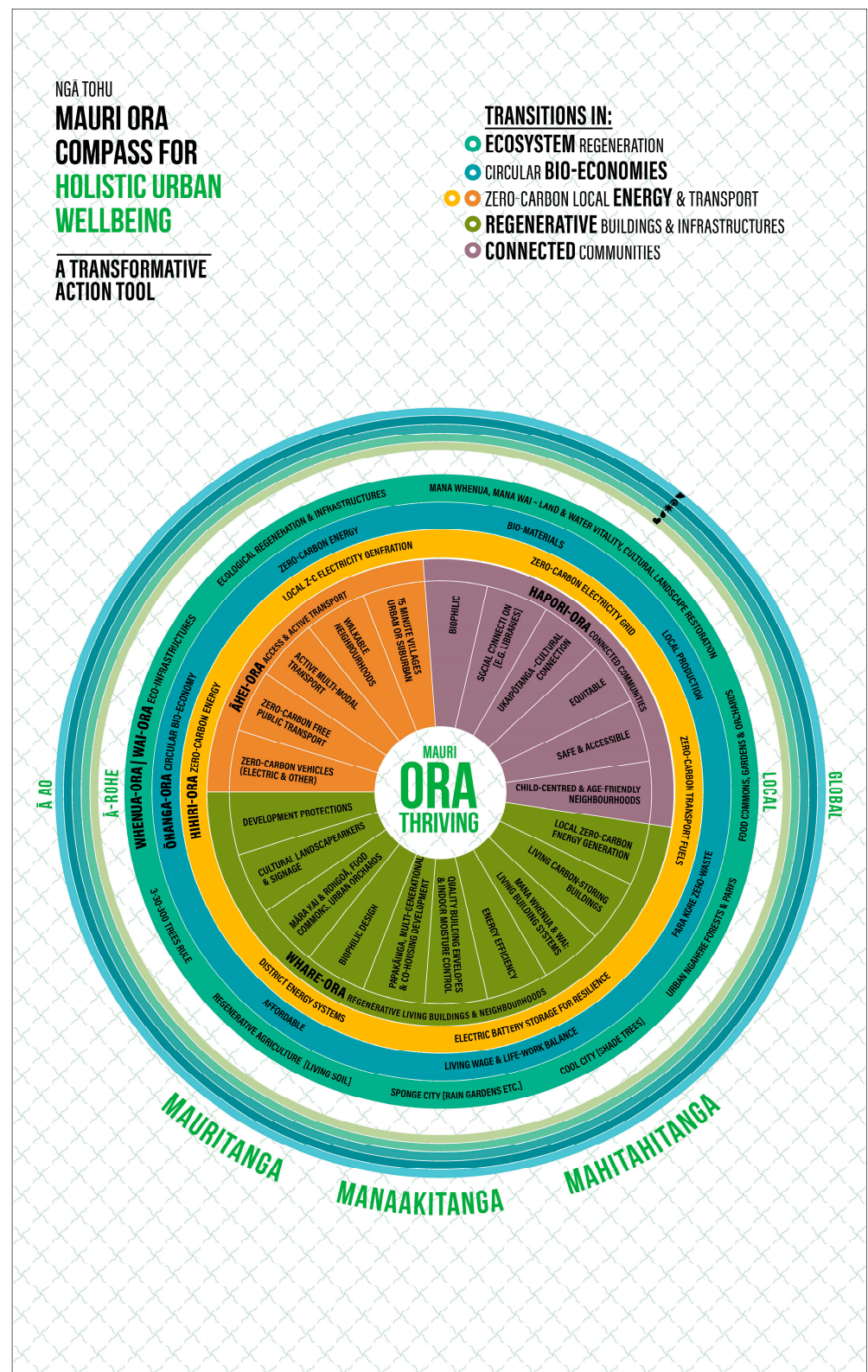


Figure 2. The Living Systems Wellbeing (LSW) or Mauri Ora Compass. Image credit: LSW kit-of-parts designers A. Yates, K. Clarke, and F. Grieve, 2022.

The Compass helps *Hoahoanga* academics understand and apply these actions in the specificity of *Aotearoa* and within the values of *mauri*. Thus, the Compass supports the programme's *pākehā* and *tauiwi* academics to teach transformation and regeneration in a

way that aligns with Indigenous expectations for *mauri ora*. This is difficult terrain. There is no simple position regarding non-Māori acknowledging, referring to, and working with *mātauranga Māori*. There is an expectation that *tauiwi* understand and are sensitive to cultural precepts. At the same time, it is imperative that *mātauranga Māori* be presented to and engaged with in a non-appropriating and ethical manner. This programme is navigating these waters. We aim to have Māori present substantively on Māori material (as tenured academics as well as via visiting professionals), with non-Māori teachers supporting *ākonga* learning as appropriate. As staff, academics, and contributors to this programme, a critical part of this is acknowledging our personal and collective responsibilities as partners. Both *Tangata Whenua* and *Tangata Tiriti* have roles in upholding *Te Tiriti* and embedding this constantly evolving and growing understanding and action into our pedagogy and practice to generate systems change. Through our pedagogical approach and place-based and regenerative curriculum, which reflects *mātauranga* and *Te Ao Māori* understandings of our world, our students are enabled as systems change agents as they emerge into the profession. In the context of this programme, our partnership responsibilities focus strongly on *mana*-enhancing participation, mutual benefit, and upholding and expressing *Tino Rangatiratanga*. It is also important to note that the creation and ongoing active engagement in safe and supportive learning spaces for our *ākonga* and the development of their understanding and practice as treaty partners is critical to landing this pedagogy.

The transformative actions that the Compass visualises are grouped according to key necessary transitions. Compass actions are framed around socially, culturally, and ecologically just transitions to protect those in the precariat and those affected by structural inequities, including those of colonisation. Systemic and structural changes in local practice are identified via specific actions in key transition areas of ecosystem regeneration, circular bio-economy, zero-carbon, local access and mobility systems, regenerative built infrastructures, and community systems. For example, actions in the regenerative built infrastructures area include designing and building with living systems or creating culturally or socially connecting buildings, such as *papakāinga* or intergenerational housing. In the ecosystem transition area, regenerative actions include the planting of urban *ngahere* or forests, the regeneration of local urban ecosystems, or the inclusion of sponge city strategies to increase resilience to heavy rain events and to increase biodiversity. In the local access and mobility transition area, regenerative actions include moving from a commuting “transport” paradigm to a local access, the 15 min neighbourhood paradigm with active mobility modes and zero-carbon public transport. Situated together as a series of actions within systemic and structural transition areas, one can begin to see both the variety, choice, and opportunity of change *and* the holistic simplicity of a transformation that centres living systems’ wellbeing. In the following section, we detail examples of how the tool has enabled regenerative learning and teaching.

3. Examples of Application

Used in all years of the programme, the Compass is introduced as an integral part of the connected courses. Students work with the Compass to scaffold their learning in a complex field and help drive regenerative design strategies. Here we outline how the Compass is supporting regenerative approaches across our *wānanga* design studio and ecologies courses.

3.1. Wānanga Architectural Design Studio Year One

As discussed, the first-year *wānanga* design studio introduces students to *whakapapa*, the underpinning of the *Te Ao Māori* relational worldview. Framed by an emerging awareness of architectural practice in a time of climate and biodiversity emergency, rapid technological evolutions and rising social and intergenerational inequity signal the planet’s anthropocentric condition. In exploration of this relationality, students are asked to investigate and interpret place through the themes of *Rangi*, *Rā*, *Whenua*, *Wai*, *Mauri*, and *Kaiao*.

The course is organised into three parts. First the students are challenged to explore and understand their place in the world: the lens they bring to experiencing “place”. They explore *pepeha*, asking the question *ko wai koe?* (who are you?) to articulate their identity through relationality and positionality. Identity is understood as connections to people, place, a sense of belonging, and networks of relationships that are framed with an awareness of your connection to all that has gone before you, that stands with you now, and all that will come after you. This lens is then turned to “neighbourhood” where the students undertake a process of exploring, interpreting, and communicating the essence and character of a place. The aim here is to test representational tools to look more carefully at the relationships, both temporal and spatial, within our local neighbourhoods that are often ephemeral and overlooked yet are core to the *genius loci*, or *mauri*, of a place. The final part of the course challenges students to design, build, and perform “sensing architecture” that explores the deployment of a designed artefact, architecture, or experience that can help us to be more conscious, able to experience and communicate the ecological consequences and opportunities in our everyday lives.

With ecological systems in crisis, it is critical that architects understand these relationships and their role in creating the Anthropocene and are challenged to look beyond this towards a sustainable future. As can be found within many Indigenous knowledges, Māori have long been aware of this relational reality. The Compass has been introduced into the year one experience via the ecologies course concerned with technologies and detail. Here the Compass supports the year one pedagogy, which emphasises a major shift from human-centred to an ecologically centred and relational design culture.

3.2. Wānanga Architectural Design Studio Year Three

The third-year *wānanga* design studio uses the Compass as an orientation device and a scaffold that supports *ākonga* to learn systems thinking and biodiversity-positive practices. In this *wānanga*, guided by the Compass, regenerative architecture at an urban scale is explored, considering how design interventions can enhance the futurity, long-term continuance, and wellbeing of local communities, both human and more-than-human.

In a 2022 project, *ākonga* proposed speculative futures for the Avondale Racecourse, a large block of land in the western suburbs of *Tāmaki Makaurau* / Auckland. The future of the racecourse, which was created by draining a wetland in the 1880s and sits adjacent to *Wai te Whau*, an important *awa* for *mana whenua*, is uncertain. The current housing shortage and demand for better use of limited urban land are important drivers for change. As development pressure comes on the racecourse land, this *wānanga*, with its focus on *ki tua*, collectively worked on researching, imagining, and designing the future guided by the *whakataukī*: “*ko te tohu mohiotanga kei tokonga whakaaro ke*,” (“the true sign of intelligence is not knowledge but imagination”).

In stage one of the project, *ākonga* were asked to collaboratively produce a feasibility study exploring the key themes: local economies, current planning, regulatory frameworks, climate change, ecologies of the area, and *tangata*, the people of the neighbourhood. Once compiled and presented, *ākonga* were asked to collectively prepare a Strategic Design Document comprised of a spatial plan, a temporal plan, and a series of regenerative development goals. The Compass was positioned as the key tool in driving the discussion and decisions that shaped this document. Given that the racecourse sits in a complex ecological zone as part of the *Te Wai Whau* catchment, some groups chose to focus on *whenua-ora* and *wai-ora*, imagining “sponge city” guidelines through interventions, such as riparian planting, stream daylighting, constructed wetlands, and planted swales. Other *ākonga* groups focused on *hapori-ora*, placing emphasis on the needs of *whānau* for social connection through designing houses for inter-generational living and child-centred streetscapes that prioritise active transport and neighbourhood connections. As the *ākonga* presented their Strategic Design Document to community stakeholders, they were asked to clearly demonstrate how the spatial plan and guidelines they proposed supported the outcomes they had chosen to focus on from the Compass.

In stage three, *ākonga* were asked to work in smaller groups to develop a single block within their spatial plan that encapsulated their selected quadrants of the Compass. With the Compass's local/global thriving *ora* leading their thinking, many invented typologies that could uniquely support the needs of the neighbourhood alongside regeneration of the ecosystem and climate health. In one *ākonga* proposal, the local produce market is retained at ground level to support food security with multi-generational living on floors above arranged around an elevated, vegetation-lined pedestrian street (Figure 3).



Figure 3. Student work in *Wānanga Architectural Design Studio Year 3*. Image credit: S. Roseman, 2022.

3.3. Architectural Ecologies

The programme's four Architectural Ecologies courses, taught in years one through three, address eco-tectonics through innovative studies in materiality, environmental performance, and practical implementation of ecological principles into built environment design. In these courses, the Mauri Ora Compass assists in understanding the connection between local actions and their impacts on the wider community and on the planetary scale. The holistic wellbeing approach leads to transformative design thinking that considers the wellbeing of people and the planet as interconnected. *Ākonga* learn that every design decision matters. Whether they are choosing a material for a building, working on a construction detail, or designing a large neighbourhood, *ākonga* can see wider relationships and visualise how small changes can lead to large-scale transformation.

All ecologies courses are actively integrated with *wānanga*, so that *ākonga* can directly apply the concepts learned to their projects. The Architectural Ecologies course taught in the first year explored ecological approaches and material assemblies for the design of *Ruma Ora*, or living rooms. *Ākonga* developed an understanding of the *whakapapa* of resources: understanding where they came from, how they were made, and where they could go at the end of a building's life cycle. Figure 4 shows an example of student work, where the natural filtration processes from oysters were incorporated into the design of a floating living space so that the intervention accommodates humans and non-humans and actively enhances the wellbeing of the local aquatic ecosystem.

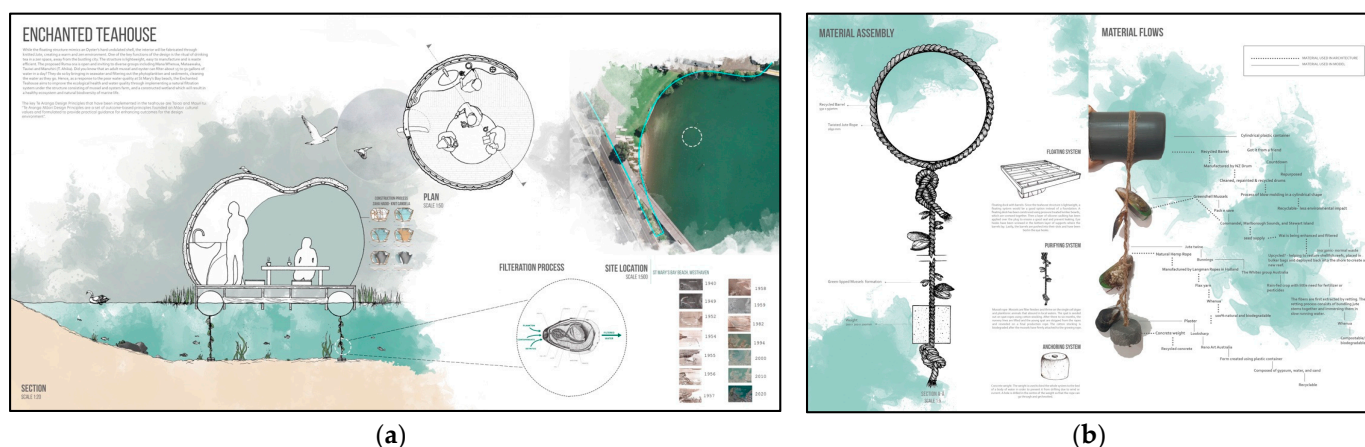


Figure 4. First-year *Wānanga* and Architectural Ecologies coursework. (a) Drawings of *Ruma Ora*. (b) Details of nature-based filtration device. Image credit: Azra Banu, 2020.

Another example of this integration between courses is the development of Life Cycle Assessments (LCA) for *wānanga* projects in the third year of the programme. Students assessed the environmental impact of their design decisions and developed iterations with different construction systems and materials to reduce environmental impact indicators according to the LCA. A holistic, integrated approach to material selection was explored, and this exercise helped *ākonga* understand the wider ecological implications of their projects.

4. Findings: Learnings and Responses

As the programme develops (the full complement of undergraduate courses was delivered for the first time in 2022), a continuous, open dialogue and co-creation process between *ākonga* and staff, as well as the wider industry, has aided in the assessment and evaluation of learning outcomes. A formal study of findings is yet to be undertaken; however, feedback from *ākonga* and academics, whether in co-creative curriculum workshops or as individuals (for example, open-ended questions included in university-wide course evaluations), has been largely positive.

4.1. *Ākonga Forum Responses*

As part of curriculum development, co-creative workshops with *ākonga* were held, along with regular steering meetings with student representatives and ongoing informal discussions to ascertain reflections on student learning experiences. In these forums, *ākonga* have commented with respect to the Compass that “it helps to understand the scaffolding of learning into future years so that senior students can support junior students even when design briefs and course outputs might change dramatically”; “it was an effective tool to structure a vertical (across years two and three) conversation based on shared understanding. The Compass is a tool that extended the ecological thinking of projects”; and “through the Compass, engagement with concepts, such as collaboration, *tuakana/teina* are contextualised and effectively modelled for non-Māori”.

4.2. *Ākonga Individual Responses*

In this section we include comments from individuals that help to understand how the Compass has influenced their learning:

“I love the Mauri Ora Compass. It has helped a lot in regard to articulating and conceptualising my project brief. When I first engaged with the Mauri Ora Compass, I started to gain a strong passion and interest for regenerative, holistic approaches and systems, which has been very rewarding”.

“I am almost passively prompted to think about holistic relationships when using the Compass ... It reminds me to think locally and globally when considering carbon

footprint in the globalisation and climate change context. I realise that everything is interconnected through using the Compass, and I understand that the impacts are sitting in feedback loops”.

4.3. Academic Team Responses

Feedback from the academic team has been positive, as the following suggests. Respondent one: “As a Māori academic I’ve enjoyed working with a tool that centres Māori cultural norms. System change is much more than just a technical process. The kind of change that is needed and is happening iteratively now will transform contemporary/settler culture. The Compass has helped communicate the more ecologically connected cultural model that is needed at this time and enabled this across a complex *Te Tiriti* partnership.”

Respondent two: “The Compass helps to deliver the programme aspirations for holistic and collaborative approaches. It has helped to focus our attention as an academic team on the detail of regenerative approaches both in the curriculum and in our pedagogical practices.”

Respondent three: “While the journey is long and the *korero* is not easy, as a *pākehā* academic I felt that, through using the Compass as a co-creation tool with students, I was more enabled to begin to teach transformation and regeneration in a way that aligns with Indigenous expectations for *mauri ora*”.

4.4. Accreditation Results

In reflection of the changing consciousness of the climate emergency, the Australia New Zealand Architecture programme accreditation competencies have been iteratively developed from a 2015 standard to a new 2021 set of competencies that incorporate awareness of carbon and Indigenous rights. The *Hoahoanga* programme completed the accreditation process with the New Zealand Registered Architects Board (NZRAB) in 2022 under the 2015 standard. The programme’s specific focus means that it pre-emptively meets many of the criteria set out in the 2021 standard.

The accreditation panel acknowledged that the courses and curriculum as presented for assessment were substantively different from business-as-usual. They responded positively to the difference in the programme with its clearly articulated agenda and curriculum. Particularly, they recognised the importance of changing architectural curricula and pedagogy so that future architects are better resourced for the environment they will design in. In our recent engagement with the accreditation process, we have received external feedback from the New Zealand Registered Architects Board (NZRAB) accreditation panel on programme attributes that are attributable in part to working with the Compass.

5. Discussion: Transferability of Transformative Pedagogies

Our move towards a transformative pedagogy is not an isolated case. There is a long history of pedagogical experimentation in architectural teaching [31,32], and in many locations, it is evident that architectural education is changing to address intertwined climate, ecological, and social justice issues. These changes can be seen in formal university-based education, such as in the Forest School: Constructive Land project, developed at the University of the Arts London (UAL) to focus attention on new ways to think about planetary resources [33], and in the teachings of Cruz and Forman at the University of Southern California (USC), centred on visualising the peripheral zones of urban crisis and developing “a new praxis of intervention” [34]. Critical architectural pedagogies are also emerging in spaces between formal education and self-organised community action, examples include the Free School of Architecture in Los Angeles, 2017–2018 [35], the Parliament of Schools, hosted by the Bauhaus Dessau in 2019 [36], and the School for Civic Action, formed by Public Works as a pedagogical experiment to test alternative modes of knowledge transfer at work in the civic city-making in London, 2019 [37]. In 2022, academics from *Huri te Ao* participated in the Architecture Beyond Capitalism school organised by the advocacy group The Architecture Lobby [38]. Our

new curriculum was discussed and strategies for replacing traditional design studios with empowering models for effecting change in the built environment were workshopped. Notable initiatives to embed Indigenous knowledge into architecture and built environment curricula have been developed by the University of New Mexico [39] and several universities in Australia [40].

It is important to consider how the findings from the *Huri Te Ao Hoahoanga* School of Future Environments might be transferable to other educational institutions in order to scale results from the transformative regenerative pedagogies described. In the experience of *Huri Te Ao Hoahoanga*, four key factors must be present for designing transformative programmes of study: (1) A clearly articulated and collectively held vision and focus; (2) A curriculum and academic team that closely expresses this vision; (3) Alignment with and deep understanding of place specific appropriate values, knowledges, and frameworks; (4) Research-driven and connected curricula to enable empowering real-world interactions. The following sections expand upon these *Four Factors for Transformative Pedagogies* (Figure 5).

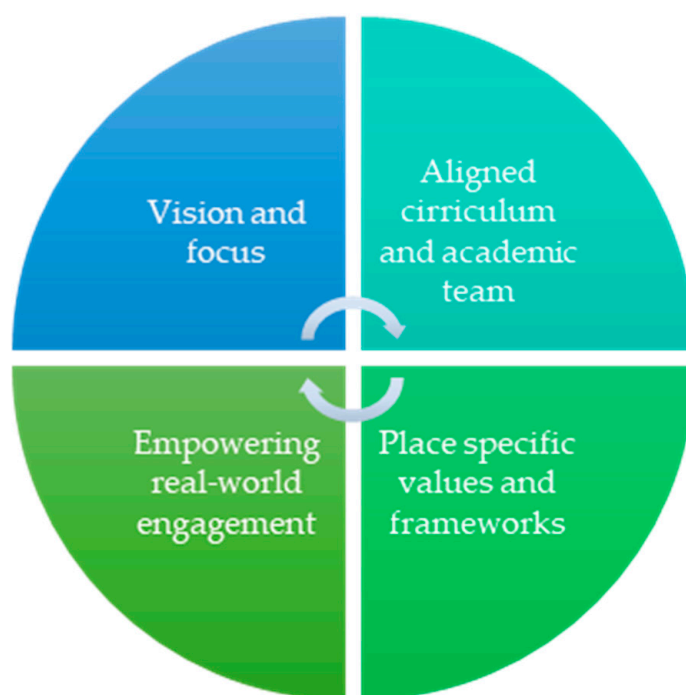


Figure 5. Four Factors for Transformative Pedagogies. Image credit: M. Pedersen Zari, 2022.

5.1. A Clearly Articulated and Collectively Held Vision and Focus

The *Huri Te Ao Hoahoanga* School of Future Environments has an inherent focus on futurity, innovation, change, and agency. For the architecture programme, the vision is that architecture must respond to converging ecological and climate emergencies through a radical change in architectural practices and resulting built environments. This focus is related to Indigenous knowledge integrated ecological-wellbeing-centred approaches, as well as human social and cultural justice-led wellbeing outcomes, which are understood to be inherently interlinked both conceptually and in measurable, tangible practice.

This clear focus and vision are important because it communicates the shared values for teaching, research, and collegiality and sets the culture for the programme itself and the people within it. It forms a framework for decision-making and goal-setting and for assessing if an aspect of the programme is successful or needs refinement. For a transformative vision to be effective, it should be clear, ambitious, inspiring, and meaningful in the context of locally held values and experiences.

Huri Te Ao Hoahoanga supports this vision by making sure it is expressed in writing about the school and programme and even in its name. A clearly articulated vision of how the practice of architecture should be is brought to the fore of any communication about the programme to academics, students, funding partners, and the general public. This vision is reinforced in processes of curriculum planning and hiring of new academics.

5.2. A Curriculum and Academic Team That Closely Expresses This Vision

Huri Te Ao Hoahoanga's focused vision thoroughly guides the planning for curricula and is integrated into every course and project. Courses are strategically planned both horizontally for each cohort across each of their courses and often vertically between both undergraduate and postgraduate programmes. This is done to integrate and reinforce learning between courses and to effectively take advantage of academic knowledge and skill. This “*kotahitanga*” approach (working together as one) is a key foundation to the programme that enables the vision to be delivered but also puts the values inherent in that vision into practice. To deliver such a programme, the academic team must have the necessary background, knowledge, skill, and dedication to the values inherent in the shared vision. Hiring is now strategic in relation to how each new person can contribute to and deliver the shared regenerative vision.

Linking the curriculum, academic capacities, and expertise very closely to the shared vision is important because this is how the vision is tangibly delivered and communicated. This enables the vision to go beyond an ambitious goal for future enactment to a guiding practice for current teaching and research planning and delivery.

Huri Te Ao Hoahoanga has supported this factor for transformative pedagogies through a Regenerative Curriculum Development Director role. The role has required expertise in traditional regenerative practices of *mātauranga Māori* and in contemporary regenerative design approaches and has involved working with *Hoahoanga* academics to co-create a regenerative curriculum. Pedagogical change tools have been important methods with which to build a shared orientation and vision for the programme and scaffold new academics into the team.

The Compass is one key tool that helps both academics and *ākonga* to orient to a complex, multi-system practice focused on social and ecological wellbeing. Importantly, the Compass helps to socialise new academics who join the team into a shared vision and culture. Other examples of programme culture forming tools include a *Kaupapa*, or manifesto, that outlines key areas of focus and a visual representation of the programme's learning journey that communicates thematic staircasing across years (from *whakapapa* to *mauri* to *ki tua*) or the connectivity of learning within a semester (as courses taken by *ākonga* connect through shared projects) (Figure 1). Finally, a *kotahitanga* semester brief can be used to connect the semester's courses together in a way that allows students to understand the relevance and connectivity of regenerative design practice, technical methods, visual communication, and theoretical frameworks. Together, these four tools aid the communication and manifestation of a significantly different, wellbeing-focused pedagogy.

5.3. Alignment with and Deep Understanding of Place Specific Appropriate Values, Knowledges, and Frameworks

Because regenerative architecture (and aligned ways of describing wellbeing increasing outcomes-focused design) is intimately place-based [41], so too must regenerative architecture pedagogies be. The example given of *Huri Te Ao Hoahoanga* with its use of the LSW Compass exemplifies how an architecture school in *Aotearoa*/New Zealand is working closely with an Indigenous knowledge-driven model of regeneration that encompasses local knowledges and values in its design, development, and application. The framework of what is locally important, appropriate, and meaningful, and how this can be measured, will differ from place to place.

Just as social and ecological systems differ from place to place, so must our regenerative approaches be place-based and sensitive to complex ecologies *and* intersectional politics. It is important that we deliver situated responses to the contemporary emergency because this is a socially and culturally just way to approach the current transition *and* because this is evidenced to be effective. Research shows that Indigenous peoples are best able to protect the ancestral lands they connect to [42], and so in Aotearoa, supporting Indigenous aspirations and knowledge is both just because it meets *Te Tiriti* partnership imperatives and necessary. Recent United Nations research has shown that international climate pledges' implementation and monitoring needs to engage with local realities on the ground and particularly needs to be developed with Indigenous partners [43]. The IPCC 6th Assessment report on climate change acknowledges that Indigenous peoples have had to meet ongoing changes in their environments with resilient and place-responsive approaches that can be valuable for adaptation now [44].

Huri Te Ao Hoahoanga supports this factor for transformative pedagogies by very consciously employing people Indigenous to Aotearoa where possible and having a relatively high proportion of New Zealanders on staff complimented by international staff. The programme aims to scaffold a collectively held and place-based vision. Here, the Compass acts as a tool for framing a curriculum that pushes past the Anthropocene's human-centred cultural framework towards a more relational and ecological model. More widely, research that focuses on local regional issues is supported and encouraged.

5.4. Research-Driven and Connected Curricula to Enable Empowering Real-World Interactions

The programme's pedagogy is research-driven as it focuses on both new and ancient knowledge for system change and regenerative design approaches. The programme is designed to enact change in the curriculum, in teaching practices, and in engagement with communities. System change is tested and embedded through our shared focus on regenerative approaches in curriculum content by exploring relationship to place and designing for social and ecological wellbeing, in pedagogical practices of collective enquiry for example, and in the use of coordinating and orienting change tools.

The programme has come about as a collective response to this time of ecological emergency. We know that we must develop new knowledge in regenerative built environments at the same time as we develop new knowledge for transformative pedagogies. At this time of necessary radical change, we all, according to our means and our place in the world, have a responsibility to engage in the live "action research" that is the practice of culture change for socio-ecological wellbeing [45,46]. For these reasons, the programme has been conceptualised and initiated as live action research. The programme's research scope and vision are defined in our *kaupapa* and other teaching tools (as described in Section 5.3). The overall structuring research question for designing projects asks "*how might we live and design well with te taiao, this living planet?*" This is, of course, a key question of our times.

The shared agenda or platform amongst *Hoahoanga* academics enables *mahitahitanga* or collaborative collective work. A range of related research projects aligns with the curriculum. The Compass is one such example, an outcome of National Science Challenge funded *Nga Kāinga Ora* urban wellbeing and system change research started in 2017 and completing in 2024. Postgraduate thesis year projects have aligned with this nationally funded research and with Rotorua-based key research partner *Te Tatau o Te Arawa*. In 2022, three years of the programme (years two and three and year one of the postgraduate programme) have focused on Rotorua as a vertical *wānanga*, with an aim to develop design interventions that realise regenerative strategies and a larger *mauri ora* vision associated with the Compass and with Te Arawa's Vision 2050 [47].

The programme has an agenda to co-create and communicate cultural change with communities in place. In the case of the Rotorua vertical *wānanga*, design work will be presented in a public exhibition in the city to build a wider discussion around urban wellbeing. The complex disruptions of COVID since 2020 have limited the capacity of *Hoahoanga* to do interactive installations or activation work, but some *wānanga* projects

have tested out these processes in limited ways. The synergies and capacity-building that comes from aligning *Hoahoanga* and funded regenerative research platforms is significant and has an important pedagogical function as it scaffolds *ākonga* to see that there is already a range of communities that share regenerative values and aims.

6. Conclusions

The built environment is a leading source of greenhouse gas emissions and is complicit in the conversion of biodiverse ecosystems into depauperate built environments. At this time of ecological emergency, there is an ethical imperative to move from catastrophic normative to transformative paradigms and practice. Architects can and must contribute to this change process, and architecture schools and their pedagogies must quickly pivot to enable transformative capacities.

This paper describes how the Living Systems Wellbeing Compass orients and scaffolds architecture students to think systemically and relationally, designing for holistic socio-ecological wellbeing. Our students are learning that the buildings and systems they design are inherently connected to local-global ecologies, that the provenance of materials and resources matters, and that architecture that integrates with biodiversity, energy, food, water, and transport systems is integral to the ecological design process. We are invested in working on live projects with communities (Indigenous, rural, urban, neighbourhoods, community organisations, and local councils, for example), to tangibly manifest this change.

Most importantly, we aim to support *ākonga* to be active change-agents now and in the future, with the capacity to co-create regenerative transformations with communities. We have developed a future-focused programme, supported by a future-focused transformative action Compass, as a means of supporting and enabling our *ākonga* to meet the exigencies of a fast-changing world. Armed with this transformative pedagogy, with its place-based, ecologically centred learning, our intent is that our students will be resourced to work collectively with others to enact transformative ecological approaches and architectures in a fast-changing future.

This paper discusses one example of transformative pedagogy that is specific to *Aotearoa*. Each location will express transformative change in unique, place-specific, and community-appropriate ways. Our experience here indicates that transforming architectural practice through a regenerative pedagogy is reliant on at least four key factors. Learnings from our programme indicate that for architectural education programmes, including ours, to be successful in the fast-changing future there is a need to: (1) evolve and reflect upon shared place-based visions; (2) work with *māhītahitanga*, or collaborative processes, with an expert team; (3) continue to build foundational partnerships with Indigenous partners and wider communities of change; and (4) enable ongoing new knowledge development and action research that contributes to the built environment and wider system change.

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Glossary of Te Reo Māori Terms

Te Reo Māori Term*Ākonga**Aotearoa**Awa**Hapori ora**Hoahoanga**Huri Te Ao**Huri Te Ao Hoahonga**Kaiao**Ki Tua**Ko wai koe?**Kōrerō**Mana Whenua**Māori**māori**Mātauranga Māori**Mauri**Mauri ora**Mauritanga**Ngāhere**Ngā tohu mauri ora**Pākehā**Papakāinga**Pepeha**Rā**Rākau**Rangatira**Rangatira Māori**Rangi**Tāmaki Makaurau**Tāngata**Tāngata Tiriti**Tāngata Whenua**Tauīwi**Te Ao Māori**Te Arawa**Te Reo Māori**Te Taiao**Te Tatau o Te Arawa**Te Tiriti o Waitangi***English Translation**

Student, learner

The land of the long white cloud, New Zealand

River, stream, waterway

Community wellbeing, wellness, health

Architecture

The School of Future Environments at AUT

The Architecture and Future Environments

Programme at AUT

Living beings

Futurity, the capacity to thrive inter-generationally

Who are you? Who are your waters?

To talk, speak, discuss. A conversation, discussion, or meeting; narrative, account, speech

Māori who hold direct whakapapa ties to an area or territory

Indigenous people of Aotearoa New Zealand

Normal, ordinary, natural, usual, common

(Indigenous) Māori knowledge

Life force, life essence, life-field, the ephemeral

Wellbeing (social and ecological), life essence

flourishing with potential ideas and connections

The act of enhancing and maintaining mauri.

Bush, forest

Vital signs,

Life, health, vitality

New Zealander of non-Māori descent

(usually European)

A housing and community development for

Māori on their ancestral land

A way of introducing yourself that incorporates

your whakapapa, kinship connections to land

and people

The sun, energy

Tree, trees

Chief, leader, esteemed and revered

Specifically, a Māori chief, leader

The sky, atmosphere, air

Auckland, specifically the Auckland isthmus

People, human beings

People of the treaty, non-Māori New Zealanders

who are partners in the treaty

People of the land, people

who *whakapapa* to the land, in *Aotearoa* that is Māori

Non-Māori

Māori world views and realities

The iwi (tribal confederation) whose lands stretch

from Māketu on the coast through the thermal district of Rotorua and Taupo to the central plateau

The Māori language

The ecosphere, planetary living systems

The partnership between Te Arawa and Rotorua

Lakes Council

The te reo Māori version of the Treaty of Waitangi,

the partnership/treaty signed between the British Crown and Māori in 1840

<i>Te Wai te Whau</i>	The Whau river in Avondale, Auckland
<i>Te Wānanga Aronui O Tāmaki Makau Rau</i>	Auckland University of Technology (AUT)
<i>Tino Rangatiratanga</i>	Sovereignty, supreme chieftainship and all the associated responsibilities
<i>Wai</i>	Water, liquid
<i>Wai ora</i>	Health, healthy water as essential part of life
<i>Wānanga</i>	Educational seminar, forum, to meet, discuss, consider
<i>Whakapapa</i>	Genealogy, lineage, kinship of human and non-human, the complex relations between people and the land
<i>Whakaora</i>	A social enterprise focused on regenerative change in built environment industries
<i>Whakataukī</i>	Māori proverb
<i>Whānau</i>	Family, close kinship group
<i>Whenua</i>	The Earth, land, also placenta or afterbirth
<i>Whenua ora</i>	Land, the Earth's wellbeing, wellness, health

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