

FROM EDGE TO CORE: Realigning sustainability in architectural education

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Abstract: Climate change and the built environment's ecological impact necessitate that we embed sustainability in architectural education. However, this often takes the form of an addition (satellite) to the prevailing core programme. In 2018 and 2019 elective courses at the School of Architecture at Unitec, New Zealand, prompted students to focus on two distinct topics: the issue of waste in New Zealand's building industry and building with low carbon materials. The experience of these 'sustainability electives' cemented the belief that the established architecture curriculum needs to evolve so that sustainability becomes the core of the programme. This paper discusses the reasons why this evolution is necessary and proposes strategies informed by a holistic view of sustainability. It suggests a reconsideration of what sustainable thinking is and challenges the dominance of quantitative and technological *solutions* to environmental *problems*. It opens up the discussion beyond the human realm and the western educational model and offers acupunctural interventions that have the potential to reimagine sustainability as the core of architectural education and thus equip students with a sense of agency to face the global ecological challenge ahead.

Keywords: Sustainability; education; indigenous; curriculum.

1. Introduction

The built environment's ecological impact and climate change demand that we embed sustainability in architectural education. However, this often arises in the form of an addition (satellite) to the prevailing model.

Architectural education often relies on the expertise of the *old masters*. Much has been written and taught about those prodigies and their works have passed the test of time. As a consequence, the thought that using their guidance and work as examples should result in what is considered 'good' architecture is reasonable. But what is good architecture? And what does it relate to? In the context of global environmental crisis, is it still appropriate and relevant to dedicate the architectural teaching curriculum to teach/learn about these *old masters* whose environmental, economic and political contexts were entirely different? Educators must explore new strategies to respond to the current ecological crises and equip students to deal with the environment in different ways from those that have led us to the brink of ecological disaster (Oxford & Lin, 2012). What if the core of architectural

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teaching was to provide students with tools to respond to today's needs and parameters? What would this look like?

In 2018 and 2019 elective courses within the School of Architecture programme at Unitec prompted students to focus on two distinct topics: the issue of waste in New Zealand's building industry (2018) and building with low carbon materials (2019). Both courses lead to creative physical installations at BuildNZ, New Zealand's leading building and construction trade event, with the aim to raise awareness and inspire a more responsible approach to designing and building. The experience of teaching these electives cemented the belief that the established architecture curriculum needs to adapt so that sustainability is the core of the programme.

Rather than describing the development and findings of these electives, this paper discusses the reasons why the learning outcomes of these sustainability-focused 'satellite electives' need to move from an addition to the core of the programme. It also proposes strategies towards this shift informed by a holistic view of sustainability suggesting a reconsideration of what sustainable thinking is and challenging the dominance of quantitative and technological *solutions* to environmental *problems*. It opens up the discussion beyond the human realm and the western educational model and finally offers *acupunctural* interventions that have the potential to reimagine sustainability as the core of architectural education.

2. The problem-solving impasse

2.1. Base ground: Information dump

Data and facts are the closest things we have at hand to create collective and personal understandings of the effects of climate change on our ecosystems and by extension on all living things. Those realities are typically communicated to us as either raw material (data interpreted by scientists often describing the situation in quantitative form) or as opinions (written by researchers, reporters or climate activists). And while it might seem difficult to emotionally relate to or even to understand raw data about the implications of the outbreaks of crown-of-thorns starfish in the Great Barrier Reef (Morton, 2019), or to the fact that most of the Netherlands is expected to be underwater in the near future (The Guardian view on the climate emergency, 2019), the sharing of personal experiences, on the other hand, seem to lead to anxiety and consequently paralysis and inaction (Harman, 2014).

The evidence of disastrous consequences of climate change is increasingly present in mainstream media, social media and governmental reports. In New Zealand, the city councils of Auckland, Wellington and Nelson have announced a climate emergency in mid-2019. Scientists are unanimous: the crisis is not a matter of point of view, it's simply a reality (Watts, 2019). This context sets the scene for today's students who are investing in their own uncertain future through higher education. In addition to the intense nature of studying architecture and the common anxiety and stress associated with higher education studies, students have now to also face the reality of this current ecological crisis.

This reality also sets the context for teaching sustainability. Most architecture programmes around the (western) world are committed to "embed" sustainability in the curriculum (Gucyeter, 2016) and educators must rely on the data, its interpretation and news reports and opinions to set a base for this learning. Author and academic Timothy Morton (2019) calls this mode of communication the "ecological information dump" and insists on the negative emotions they cause on individuals. According to the author, the facts "are out of date by the time they drop on you. Slapping you upside the head to make you feel bad. Shaking your lapels while yelling disturbing facts. Handwringing in agony about 'What are

we going to do?”). He mentions the authoritative effect of this delivery mode which “seems to be about dumping massive platefuls of facts on to us” and the uncertainty and anxiety it produces. Morton (2019) suggests that this dumping “is a symptom of something much bigger than feelings about stuff you read in the newspaper”.

As educators, we must be conscious of the ways we deliver the contextual information that will inform the base for teaching sustainability. The issue is simply too important to allow anxiety, hopelessness and despair be the ground of sustainable education. Despite the importance of the facts, this way of defining (delivering) the context creates a *problem-focused* foundation for teaching which naturally leads to a search for *solutions*.

2.2. Tech-dominance

At the beginning of the sustainability-focused elective courses taught at Unitec Institute of Technology in 2018 and 2019, lecturers engaged students with the topic of sustainable architecture starting with what sustainable architecture is not. The internet is partially to blame for sustainable architecture miseducation. A simple task they got them to do was to type the words sustainable + architecture into Google Images Search and critically evaluate the results. Invariably, those results appeared in the form of a flock of images of high-rise buildings, multimillion-urban-skyscrapers designed by famous architecture firms, made of steel and glass with some green (in the form of plant species) somehow attached to facades or peeking out from between the floors. This seemingly simple search should not be underestimated. Students constantly complement what they learn in the classroom with what they find online. This seductive visual-only ‘research’ has the effect of skewing students’ perception and reducing complex concepts of sustainability to high-tech green towers.

In fact, this search is also a result of a limited, yet dominant, aspect of sustainability in the industry. Sustainable buildings are analysed, measured, accredited points, stars and certifications. LEED, LBC, GreenStar, CASBEE, EDGE are only a handful of the current existing certifications worldwide that assess the sustainable performance of a building against a set of criteria such as energy efficiency, water use, materials, waste management, interior air quality or innovation. In order to achieve good scores, architects often rely on other professions such as engineering and building science to add-on technological (magical) solutions that will help their designs become examples of sustainability. In her paper *The Place of Sustainability in Architectural Education: Discussion and Suggestions*, Basak Gucyeter (2016) expands on this topic and adds that “the design of buildings becomes partly in control of architects and partly in control of engineers, who are prepared to introduce the latest technology / service in selection of materials, environmental systems etc.” The author also points to the issue of this quantitative approach: “the supremacy of sustainable technologies over concepts such as locality, minimal use of resources, environmental design approaches might result in stereotype sustainability measures within the built environment, which aren’t incorporated in the aesthetics of design, and are solely technological fixes.” Illustrating further this idea, Røstvik (2018) adds:

The road toward more sustainable architecture and town planning encompasses cultural, social and environmental factors. Instead of this leading to radical alternative solutions, the main result has been to improve the current established technologies. Buildings are getting more and more technologically complicated. Architects seem to go along with that and hence passively strengthen a development that many feel is going in the wrong direction.

Education is where those risks can be mitigated. In the MSc programme in Sustainable Architecture at NTNU in Norway, architecture and engineering students collaborate in multidisciplinary projects where they constantly engage with qualitative and quantitative aspects of architecture, digital and analogue worlds and both the left and right side of their brains. Coordinator of this programme Luca Finocchiaro (2018) explains that “sustainability in architectural education cannot be limited to making students aware of environmental challenges and ready-made solutions, nor to make them able to limit environmental impact of the built environment on a pure numerical basis”.

The tech-focused approach to sustainable architecture has led to a weakening of the deeper meaning of sustainability. Although finding a balance between technology and concept (or intuition and science) as suggested by Finocchiaro resonates as a sensible teaching strategy, this dichotomy may have the effect of equalising the levels of importance of the contrasting aspects. Instead, it may be insightful to take a step back to note the existence of connections and relationships between built form and nature, technology and human, human and nature with the intention of relinking to the deeper meaning of sustainability and its importance.

3. Beyond anthropocenic isolation

3.1. Interconnectedness

In current architectural education (and profession) sustainability seems to have become a (technological) *solution* to a *problem* (climate change) with a practical emphasis on knowing rather than feeling. But to quote Timothy Morton (2018) “it seems to be not enough just to know stuff. In fact, it seems like ‘just knowing stuff’ is never just knowing stuff [...]. ‘Just knowing stuff’ is a way of living things too. And knowing that there is a way of living things implies there could be other ways too”. The author makes a clear distinction between the collection of facts about ecology (the ‘information dump’) and ecological thinking (feeling and living).

The anthropocenic view that shapes western architectural education has disconnected humans from seeing their buildings as parts of larger systems. This disconnection may very well have been intentional and in fact, at the core of civilizational progress. Architecture as an instrument of this progress has always intended to become independent from time, weather, typology, resources (Wang, 2009), but also from other beings, cultures, and living things. Although it is impossible to argue that buildings are made by the human species for the human species, they do not belong to an exclusively human world. The world is not exclusively human. The human species is not self-sufficient and in fact a technologically driven strive to resolve issues of sustainability with innovation might actually enable the continuation of the current unsustainable western lifestyle (Wang, 2009). As Wilfried Wang (2009) expands on John Donne’s 1624 prose “no man is an island”, “no species is an island”.

A building is not ‘connected’ to the ground by its foundations. It is essentially made of the same atoms that the soil it sits on. Regardless of how much manufacturing processing it has undergone, nature has in a way or another made the very materials of a building. It is a part of endless complex systems that span physical, social, political, economic, behavioural, emotional, natural, supernatural and perhaps spiritual and celestial realms. Interconnected in visible and invisible ways, with no beginning and no end.

The human species is no exception. Not only we are made of those same atoms, it also appears that there are more non-human cells than human cells on our bodies. We are largely made of fungi, bacteria and other viruses which are in turn connected to rest of our species and to non-human species too

(Thackara, 2015). In the book chapter *Systems Thinking and Systems Feeling in architectural education*, Massimo Santanicchia (2018) writes that systems thinking and feeling “brings us together, not only to see the world and its components, but also to feel that we are part of it; we are part of the same system, we are together”. This is essentially the foundation of regenerative design, a whole system approach where “the sustainability of a living system is tied directly to its beneficial integration into a larger system. The smaller system contributes to the larger system’s development and, in turn, receives nourishment for its own.” (Mang & Haggard, 2016).

These approaches of viewing our species and its habitat as integral part of interconnected systems have significant implications in a redefinition of sustainability in the architectural education context. They are not new or unique, they are found in most indigenous views of the world.

3.2. ‘Pākehācentric’ thinking and indigenous paradigm

It is important to note here that the observations discussed so far when referring to sustainable architecture are those from within a western (white, male, heterosexual, capitalist) vision of architectural education; in other words, the prevailing model. Adopting an indigenous perspective to the same topic would entirely redefine the premises of these discussions.

In Aotearoa (New Zealand), indigenous perspective and knowledge are carried by tangata whenua – Māori people, ‘the people of the land’. In Te Ao Māori (Māori worldview), people have a deep connection to their ancestors, human and non-human entities through their whakapapa (translated as genealogy, lineage or descent although it can be argued that English translations of Māori words generally do not convey the depth and multi-layered characteristics of te reo Māori, Māori language). This connection is carried by Māori throughout their physical and spiritual lives and beyond. It is a matter of reciprocity where hierarchy has very little relevance. Where European ontology is linear and hierarchical, Māori ontology is circular and reciprocal (Warne, 2019). Communication and relationship between humans, earth, sky and spirits shape Māori approach to life, mahi (work, activity) and relationships with other livings and the land.

In a contribution to the book *Listening to the people of the land* edited by Susan Healy, Kennedy Warne (2019) quotes Tamati Kruger of Ngāi Tūhoe “We are this land and we are the face of the land. Wherever those mountains come from, that’s where we come from. Wherever the mist emerges from and disappears to, that’s where we come from.” The author develops on the fundamental differences between European settler and Māori viewpoints, especially pointing to the ease with which Māori navigate between the physical and the more-than-physical realms, natural and supernatural whereas this interpermeation as defined by Warne is marginal in the Western world view. Another major difference can be observed in the western focus on self and ego as identified by Descartes’ cogito. The evidence of existence acknowledged by self-thinking. On this point, Warne (2019) adds: “If the Enlightenment view is epitomised in “I think therefore I am,” the Māori understanding is “I relate therefore I am.”

In the midst of these differences, there is hope for reconciliation. Reconciliation not employed here as a result of compromises agreed upon by two opposing parties but rather as a common understanding, a will to deeply connect, to respect and to agree to act collectively for the benefit of all human and non-human, whether identifying as descendants of Papatūānuku and Ranginui (the earth mother and the sky father, considered in Te Ao Māori as parents of all physical and non-physical beings) or not. New Zealand was the first country to grant natural resources legal personhood (equal rights to

human beings). In 2014, Te Urewera Bill was passed giving legal rights to Te Urewera forest followed in 2017 by Te Awa Tupua Bill which made Te Awa Tupua (Whanganui river) the first river to receive legal personhood. This legally binding recognition by the Crown of the existing relationship between the land and its people can be considered as a unique step in this path of reconciliation.

Ko au te awa, ko te awa ko au – I am the river, the river is me

Focusing back on teaching sustainability in architectural education, the very first engagement required in any type of project is the defining of the context and understanding of place. As argued in the previous part, this vital engagement commonly comes in the form of data, information about climate, noise, demographics, typography, etc. and forms the parameter set the project will need to respond to. Cultural and historical layers are not ignored but often represented as another set of information analysed and considered from a human perspective. Taking a Māori approach to this first engagement with context and site could have the potential to expand the parameters set to include a living matrix of encounters and relationships, past and present, natural and spiritual (Warne, 2019).

Unlocking our ability to use our indigenous mind-set could be a necessary shift to structurally embed sustainability in architectural education.

4. Acupunctural interventions in the curriculum

What this paper suggests is that a radical change in the way sustainability is taught in architectural education does not necessarily imply a radical transformation of the current curriculum. Instead, it proposes *acupunctural* interventions which are specific, tangible and easily implemented but that have the potential to impact the whole system. They are here divided into two categories: the framework and the approach. The framework refers to interventions in the environment, the curriculum and educators' mind-set while the approach discusses direct strategies in class.

4.1. The framework

The very first change that would allow this shift to occur is a commitment to teach sustainability in all courses rather than focusing on elective courses or specialisations. Those could continue to exist to deepen specific aspects (such as waste in the building industry or straw bale prefabricated construction as in the elective projects discussed further in this paper) but should not be seen as having the ability to take on the whole load (and complexity) of the subject. In fact, as argued by Basak Gucyeter (2016), “the idea of specialization is essentially contrary to the nature of sustainable architecture” and a holistic view needs to be implemented in the programmes. This view is reinforced by Stewart (2012) who supports the idea of an environmental literacy graduation requirement but argue that single courses on the subject are not enough to “expect students to understand complex relationships between the environment, society, and the economy”. The author suggests that multidisciplinary is an essential component of transformative eco-education and that the linking between curriculum and place and the integration across disciplines have the ability to reinforce students' critical thinking and therefore prepare them to face complex 21st-century problems.

A common restraint that prevents architecture educators to integrate sustainability into all their existing courses is the lack of alignment and direction in teaching priorities. At a time when the IPCC suggests we have about 12 years to make radical changes in order to limit the climate disasters ahead (Watts, 2019), it seems a logical response to challenge architectural education's status quo. Offering workshops to educators run by experts and facilitate staff group discussions around place-based

sustainability teaching might be the first steps towards a more holistic approach in teaching sustainability. So, to create a transformative teaching, this needs to happen at different levels (not only in the learning outcomes of the teaching curriculum). It needs to be reflected during orientation days, start in the first year of studies, link to other disciplines, be held in a campus that models sustainability (physically and in essence) and demonstrated in academic qualifications. By adopting these simple strategies, Stewart (2012) offers a vision where “students are part of an academic environment where they see connections between disciplines and work collaboratively to find interdisciplinary solutions to real-world problems. They experience living in a low-carbon, resource-smart community and can therefore look at society through new lenses. They are inspired to find new and creative ways of further greening their campuses and to actively seek opportunities to share what they are learning with communities beyond their institutions”.

Having this base framework within the institution would ease the path to a deeper way of teaching sustainability in the context of architectural education.

4.2. The approach

In order to begin learning and teaching sustainability, it is first worth looking at some common definitions. The word sustainability has become a buzzword used and misused so often that it has lost focused meaning. First of all, we need a definition for this term (in the context of architecture) as it has become more of a marketing tool rather than a value (such as the words regeneration or resilience have in the past years). Sustainability according to Brundtland (1987) is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” This accepted definition is largely human-centred and focuses on the fulfilment of human needs – mostly subjective considering the difference in ‘needs’ whether you live in L.A. or Kinshasa, capital of Congo considered one of the poorest country in the world.

Coined by Leon Jakobovits in the sixties, semantic satiation is the psychological phenomenon of the loss of meaning of a word due to repetition (Wikipedia Contributors, 2019). If you repeat the word table a hundred times, it loses its meaning and becomes merely a sound. To bring back the meaning of that word, it is a good exercise to use different words to explain what it actually is: a flat surface generally elevated on 4 legs allowing humans to perform a wide range of activities while sitting. Trying new ways of expressing commonalities may have the effect of reviving them and reminding of their use and true meaning. So instead of talking about climate change (which sounds rather weak given the circumstances) we could shift to mass extinction or the “likely upcoming sixth great extinction caused by human activities-induced change in the global climate” (Morton, 2018). In the same way, the task of redefining terms such as sustainability, ecology, green architecture, etc. could be a strategy to get students engaged on a deeper level.

Another approach when setting the context is to step away from ‘information dumping’. In both electives mentioned in this paper, the context was set with a series of lectures and presentations largely composed of gloomy facts about climate change and the state of the planet. It seemed to be the logical (and only) necessary step to initiate learning. This approach equips students with information that they can share further but also causes a certain degree of fear, helplessness that might not be relieved by the content of the course. Although there is a need to use facts and data to a certain extent to support academic learning and teaching, a strategy more focused on the possibilities and potential of sustainable architecture rather than on where and how it usually fails might be more empowering. By learning about the consequences of doing things in a sustainable way rather the consequences of not

doing them sustainably, the course outcome has better chances to move to a higher level of learning. This higher-level-driven approach needs to be complemented by experience and place-based multidisciplinary learning in order for learners to feel connected and empowered to activate change in the industry.

This positive approach has the potential to enhance students' power of agency. Away from the paralysis caused by the constant information blast about climate facts, students might experience a stronger will to collaborate and act creatively. This energy was experienced in the project *Straw Into Gold* run at Unitec School of Architecture in 2019. Following a series of lectures and workshops on climate change and the role of low carbon materials, students were investigating the use of prefabricated timber and straw wall panels for mainstream house construction. The experiment resulted in a one third scale model of a small habitable structure showcased at a major construction event. Students engagement was high throughout the course and many students devoted much more time than what was required. This level of engagement was likely due to the positive nature of the outcome and to the clarity of intention.

The previous project *From the Waste up*, although more creatively challenging, failed in keeping students constantly engaged possibly because of its intention being too partial. Indeed, the project's initial aim was to address the issue of waste in the building industry through a series of workshops resulting in a physical installation at a show. Set among key players in New Zealand's building industry, the display showcased symbolic objects made of discarded building materials. The process of transforming unwanted materials into crafted objects demonstrated the faculty of generating a shift in perception where new potential can emerge and waste becomes a valuable resource. A possible flaw of this project might have been the fact that it didn't offer the possibility to engage with it once the course was over.

The main difference between the way these two projects were tackled created the basis for the reflections shared in this paper. While *From the Waste Up* emerged from the study of a major *problem* in New Zealand's building industry (waste), *Straw Into Gold* explored the *potential* of using a widely available by-product of agriculture (straw). This difference of approach in starting a project looking at a problem or a potential seems to influence the whole development of the course and beyond.

5. Conclusion

The reflections presented in this paper are not new or radical. They are mere observations of what is currently experienced in learning and teaching sustainability in and outside the classroom. What this research offers are strategies to adapt current architecture curricula to respond to today's parameters based on a holistic view of sustainability. This view recalibrates the way facts and data are shared, the place of technology, the extent of the field to non-human experiences and multidisciplinary realms and suggests strategies to enhance learning.

To face the current ecological situation, we need a generation of students and architects armed with knowledge about the true state of the planet but also with a sense of agency in sustainable design and thinking. It is also crucial to accept that teachers are no longer holders of knowledge that has to be passed on but rather active learners that are able to facilitate collaborative learning – including their own learning. This shift is essential as no one holds today's parameters as knowledge, but everyone is experiencing them and therefore can bring a valuable contribution to a collective intelligence, a collective understanding of today's world and its priorities.

These observations do not intend to disregard the growing amount of efforts being made worldwide to truly build better (eco-architecture, earth buildings, off-the grid projects, tiny houses with lower carbon footprints, etc). But no matter how many they are, they remain exceptions. Recurring exceptions. Not mainstream. And so is teaching sustainability. It is present but still considered a satellite orbiting around the globe of the *old masters*.

Perhaps one day graduates will leave schools of architecture knowing how to rebuild the soil to sequester more carbon and improve ecosystems while creating resilient communities all of this with an architecture full of elegance and intrinsic beauty. And only those who would have done a 'satellite elective' will know about the work of Le Corbusier. Shocking thought today... but would it make a better world?

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