LEARNING THROUGH THE MULTIDISCIPLINARY STUDIO: A PEDAGOGICAL APPROACH FOR LANDSCAPE/ARCHITECTURE COLLABORATION

XINXIN WANG
DR MATTHEW BRADBURY
DR LÚCIA CAMARGOS MELCHIORS

Pedagogy / sustainable design

This publication may be cited as: Wang, X., Bradbury, M., & Melchiors, L. C. (2021). Learning Through the Multidisciplinary Studio: A pedagogical approach for landscape/architecture collaboration. In E. Papoutsaki and M. Shannon (Eds.), *Unitec Research Symposium Proceedings 2020* (pp. 22–38). Auckland, New Zealand: ePress, Unitec New Zealand.

Contact:
epress@unitec.ac.nz
www.unitec.ac.nz/epress/
Unitec New Zealand
Private Bag 92025, Victoria Street West
Auckland 1142
Aotearoa New Zealand

ISBN 978-0-473-59389-6

ePress

Unitec Institute of Technology
TE WHARE WĀNANGA O WAIRAKA

ABSTRACT

Conventional design education emphasises disciplinary boundaries that are related to professional obligations. For the architecture and landscape architecture disciplines, the traditional studio of design education has emphasised conventional disciplinary thinking. However, given the many pressing contemporary issues the design professions are facing, not least the effects of climate change, this siloed thinking is proving inadequate to explore new solutions to building a sustainable city.

We argue that a multidisciplinary focus for the design professional is a more appropriate way to meet these severe challenges to the sustainability of our cities. Architects and landscape architects need to work together to share expertise, specialist knowledge and skills to develop more comprehensive solutions than those of the individual disciplines.

In response to this challenge, the Unitec School of Architecture has established a joint design studio to explore how to design urban spaces in a multidisciplinary and collaborative environment. The studio brings senior architecture students and landscape architecture students together for a one-semester design project. Students work in groups with similar numbers from each discipline. The studio framework is deliberated to discuss contemporary urban design issues presented by stakeholders in a multidisciplinary learning space. Two key pillars are Research by Design as the critical design method and acknowledgment of mana whenua (the Indigenous Māori people with historical and territorial rights over the land).

The collaboration process is organised as group-based research for the masterplan phase, followed by individual design work. Teaching–learning activities are arranged to support group and individual design work. After six years of working on contemporary urban issues, the learning outcomes of the studio suggest that students have been able to expand their creative capacity to develop design strategies that have broken down traditional disciplinary boundaries to deal with complex urban issues.

The results suggest that the multidisciplinary approach has fostered methodological and analytic interaction amongst landscape and architecture students for six years of design exploration. The studio has enabled students to gain a holistic understanding of contemporary urban issues, and an active and collaborative design process has developed iterative design solutions. The multidisciplinary studio has been an effective teaching–learning method that can help design educators develop effective studio teaching models to facilitate interdisciplinary collaboration.

KEYWORDS

design education, multidisciplary learning, design pedagogy, architecture students, landscape architecture students, Unitec New Zealand

INTRODUCTION

The design studio is the typical pedagogical environment for students to learn design skills through the exploration of usual, often typological problems. The architecture and landscape architecture learning environments are typically based on design-studio teaching, but, while sharing some disciplinary commonalities, are usually

developed as independent programmes (Koo, 2012). At Unitec, Te Whare Wānanga o Wairaka, the Bachelor of Architectural Studies (BAS) and Bachelor of Landscape Architecture (BLA) are taught as separate programmes.

Landscape architecture studios traditionally train students to design open spaces, typically large public areas such as parks and civic spaces. Architecture studios usually focus on teaching students to create buildings. These studios are essential for junior students to learn fundamental design principles and address simple design problems within their professional boundaries (Park, 2020). However, in the senior year of study, both landscape and architecture students are expected to deal with more complex design problems. These issues are often characterised by multi-layered climatic, biotic, spatial and cultural concerns that are often beyond the capabilities of a single individual student (Koo, 2012; Park, 2020; Soliman, 2017). It is here that a multidisciplinary collaboration between the landscape architecture and architecture disciplines can help students to address complex issues.

Demand for collaboration in design studios also comes from several external forces. Many professional bodies consider the capacity to co-operate with a wide range of disciplines as one of the core values for landscape architects, architects and urban designers (Koo, 2012; Park, 2020). The development of leadership and teamwork skills is also critical, especially the designer's ability to synthesise knowledge, negotiate design direction and integrate design solutions (Leathem et al., 2019). The ability to communicate, present and respond to non-professionals, such as clients and users, is also expected in the development of a design professional (Leathem et al., 2019; Soliman, 2017).

There is also a strong need to bring a social dimension to the design studio to broaden conventional spatial-design thinking. In many design schools in New Zealand, final-year students are expected to transfer generalised theory to localised, site-specific design solutions, especially ones that respond to mana whenua, to help reflect Indigenous values. The social realm demands an understanding of the many layers and aspects of site-specific knowledge that would not be fully grasped in single-disciplinary training (Koo, 2012; Park, 2020). A more comprehensive approach is needed to address these issues, which a multidisciplinary collaboration between landscape and architecture studios can start to explore.

However, despite the need and expectation from the design industry for graduates to integrate with different disciplines, the multidisciplinary approach does not seem to be widely implemented in architectural and landscape education. In a study of 24 American universities, Koo (2012) found that integration between the landscape and architecture disciplines is weak in both design studio and lecture courses. Koo points out that landscape and architecture studios mainly focus on students working in their own discipline; few studios offer learning opportunities for students from the other discipline. The lack of multidisciplinary integration in architectural studios is also highlighted by Soliman (2017) and Leathem et al. (2019) in their pedagogical research.

Driven by a consideration of these concerns, the adjacencies of the architecture and landscape programmes at Unitec, and several pressing urban issues that have become evident in the rapidly urbanising Auckland region, a joint landscape/architecture studio has been established at Unitec. The collaborative studio, started in 2016, aims to foster a learning environment that enables students to exchange skills, share experience, discuss complementary views and create a collaborative design process closer to that of professional practice.

The first section of this paper discusses the issues around conventional design education and suggests a need for a more innovative approach. The second part presents a pedagogical approach, a multidisciplinary studio, that includes a studio framework and a collaboration process. The Results section summarises the results of six years of studio teaching, detailing student achievements through internal and external collaboration. Following a description of the features of the joint studio, the paper closes by discussing the successes and challenges of this particular pedagogical approach.

APPROACHES FOR MULTIDISCIPLINARY COLLABORATION

The studio is designed as a multidisciplinary and collaborative approach to design education. The collaborative approach starts from the multidisciplinary teaching team: an urban designer, landscape architect and architect from different national backgrounds. The subjects of the studio projects are carefully chosen to reflect collaborative goals. Each studio project is connected to a contemporary issue, with a client, a concerned community and a physical site that will be specifically affected by both urban changes and the effects of climate change.

Landscape architecture and architecture students are organised in groups; each group has four to six students, with similar numbers from each discipline. Students also engage closely with the affected community: stakeholders, government agencies, practitioners, community groups and mana whenua (the Indigenous Māori people with historical and territorial rights over the land) (Auckland Council, n.d.a). The collaborative process takes 12 weeks: six weeks' team work on a masterplan and six weeks' work on an individual building or landscape design. Students are expected to carry through strategies from the group masterplan to their individual projects.

The collaborative process is facilitated by a studio framework that consists of four key approaches and is supported by a wide range of teaching–learning methods. The four key approaches are highlighted here and will be explained in detail.

- A contemporary design problem with connected stakeholders. This approach offers students the experience of exploring contemporary urban issues that are connected to landscape and architecture practice. This allows students to learn from studying real-life problems (Cerra, 2016; Ng, 2013).
- Creating a multidisciplinary space for collaborative learning. Multidisciplinary teamwork is essential in successful professional practice (Soliman, 2017). Facilitating an interactive collaborative learning environment helps landscape and architecture students to learn from each other.
- Research by Design: The importance of Research by Design has been highlighted by many scholars as an important way to generate an integrative approach in the creative professions (Hauberg, 2011; Roggema, 2017).
- Acknowledgment of mana whenua through collective learning and active engagement with the local community. Embedding Te Aranga Principles in the design process is critical to help students acknowledge their responsibilities to Māori under Te Tiriti o Waitangi (Kake & Paul, 2018).

Contemporary design problems with engaged stakeholders

Exploring contemporary design problems in studio teaching has been recommended by many scholars and educators (Koo, 2012; Young, 1993). This approach is particularly useful in a multidisciplinary studio, because it helps students connect to problems that affect them directly (Park, 2020). This approach can also challenge students' conventional design thinking and push them to work collaboratively beyond their professional boundaries (Ng, 2013). This approach guides the selection of each year's project, helping the teaching team align with a significant urban issue in the Auckland region. In this way, the studio also promotes lively interaction between the landscape and architecture disciplines. By working closely with clients and communities, students are expected to work in a design environment that is close to professional practice.

The first project was in 2016, located in Wellsford, a small town situated on Auckland's northern fringe. The town was chosen as a site because it encompassed many issues of the sprawl vs compact city debate (Lowrie, 2014) that were part of the discussion of Auckland's future direction. Students worked in teams to explore sustainable regional-development models that were an alternative to the compact-city model.

In 2017, the environmental effects of climate change started to become a critical issue around the world (Carter et al., 2015; Thead, 2016). The demand for local, practical solutions became more urgent (Climate Change Adaptation Technical Working Group, 2017; Morton, 2017). Two locations, the Hīhīaua Peninsula in Whangārei and the Port of Onehunga in Auckland, were chosen as sites for studio projects. The aim of these projects was to investigate

different climate adaptation strategies without undermining the typical waterfront model (Bradbury et al., 2018; Wang et al., 2021).

The Hīhīaua project was initiated by the Momentum North group (a community group in Whangārei) in 2017. The Onehunga project was supported by Panuku Development Auckland (an Auckland Council-controlled organisation that delivers urban regeneration) in 2019 and 2020. In 2021, high-density housing development became an urgent issue due to the land-supply constraints in Auckland and the post-Covid market. Kāinga Ora, the New Zealand housing and urban development authority, suggested that the joint studio explore a site in the Tāmaki redevelopment zone, the Maybury Street block. Two issues were important: the provision of high-density housing on a site with the potential for extensive flooding due to climate change. Table 1 summarises the design problems and key stakeholders involved in the studio projects from 2016 to 2021.

Year	Project	Site location	Design problems	Clients	Other stakeholders
2016	Wellsford	Upper Rodney, Auckland	Sprawl vs compact debate of Auckland regional development	Auckland Council	Wellsford community
2017	Hīhīaua Peninsula	Whangārei, Northland	Climate change; waterfront revitalisation	The Momentum North group	Hīhīaua community; Whangārei District Council; He Puna Marama Trust; Te Kopu Pacific Indigenous and Local Knowledge Centre of Distinction
2018	Mt Roskill	Mt Roskill–Mt Albert, Auckland	Suburban intensification		Mt Roskill community
2019	Port of Onehunga	Onehunga, Auckland	Climate change; waterfront redevelopment	Panuku Development Auckland	Onehunga Township; Rau Hoskins
2020	Port of Onehunga	Onehunga, Auckland	Climate change; waterfront redevelopment	Panuku Development Auckland	Onehunga Township; Amiria Puia-Taylor, director of The 312 Hub
2021	Maybury Street	Glen Innes, Auckland	Housing development; climate change	Kāinga Ora	Guest speakers from NIWA, Healthy Waters; Rau Hoskins, WSP NZ Ltd

Table 1: Design problems and clients (stakeholders) in the joint landscape/architecture studio.

Creating a multidisciplinary space for collaborative learning

The core approach used in the joint landscape/architecture studio is collaborative learning. This is an approach that encourages students to understand non-routine perspectives, and promotes knowledge exchange and the appreciation of diversity through sharing different design viewpoints, learning new approaches and techniques (Hirt & Luescher, 2007; Kim et al., 2015). Using this method, knowledge is socially constructed through a learning process that occurs via peer conversations, feedback and constructive conflicts. In a multidisciplinary setting,

different disciplinary backgrounds complement students' experiences and skills to deal with complex urban problems (De Hei et al., 2015; Hirt & Luescher, 2007; Kim et al., 2015; Miles, 2018).

Collaborative learning is promoted by internal and external activities beyond the studio space that require a disciplinary mix of competencies. In addition to the conventional studio environment in which lecturers give presentations and provide feedback, the joint studio encourages active learning by providing opportunities for students to present ideas and give feedback.

These opportunities include students' oral and visual presentations, informal pin-ups and discussions, discussion among groups, peer feedback between groups, and student–lecturer discussion. The external activities emphasise direct engagement with stakeholders. They not only include client-led site visits, client presentations and briefing, but also critiques from guest experts in landscape, architecture and stormwater. Presentations to mana whenua and to the community are also a critical part of the external collaboration.

Research by Design

An important approach employed by the joint studio is Research by Design, which is highlighted by many educators as being suitable for the creative disciplines (De Queiroz Barbosa et al., 2014; Hauberg, 2011; Roggema, 2017; Verbeke, 2011). It is a methodology that helps students to see that the design process is also a research process. In this way of thinking, the design is not only an outcome, but a tool, part of the creative process, and can be used to reflect on complex problems (Hauberg, 2011; Roggema, 2017; De Queiroz Barbosa et al., 2014; Verbeke, 2011). Research by Design also plays a critical role in the landscape/architecture interaction, because design presentation, such as sketching, mapping, modelling, technical drawing and 3D rendering, is a common way to actively represent cognitive ideas. This can help visualise thoughts that are often difficult to express orally (Hauberg, 2011).

In the joint landscape/architecture studio, Research by Design is consciously used as the project development methodology. The process starts from the first week through a mix of literature review, precedent study, contextual analysis and site analysis. These tasks are divided among group members, based on their strengths. For example, landscape students typically undertake research on climate change, environment, history and cultural issues, while architecture students usually focus on the built form, housing typology and social issues. At the end of the second week, each group produces a research report, consisting of findings from literature and case studies, analysis of the site and identified design strategies. The research findings then guide the following four-week masterplan phase: each group explores potential design solutions, evaluates their suitability for the site and makes a design direction. The result for each group is a masterplan that integrates both landscape and architecture strategies. The next part of the project is an individual-based process lasting six weeks. Following the design objectives developed in the masterplan, each team member chooses one site for an individual design project. Although the projects are all different, with landscape students working on an open space and architecture students working on a building, students are encouraged to continue their group collaboration throughout the detailed design phase by prioritising the interface between buildings and open spaces.

Acknowledgement of mana whenua through collective learning and active engagement with the local community

A critical part of the studio collaboration is acknowledging mana whenua. To do this, the studio incorporates the Te Aranga Māori Design Principles – a set of principles based on intrinsic Indigenous cultural values (Auckland Design Manual, 2018). Matauranga Māori (Māori culture) articulates the past, present and future, incorporating both physical and spiritual dimensions and the idea of connecting whānau (extended family) and whenua (land), flora, fauna and natural elements. These principles emerged through an engagement between mana whenua that originated in the Māori desire to enhance their culture, presence, visibility and participation in the design of the physical environment (Kake & Paul, 2018). Te Aranga Principles provide directions to positively respond to mana whenua, aiming to form a holistic view of the built environment and its connection to mana whenua, which might be missing in a separated landscape or architecture studio.

The teaching–learning of Te Aranga Principles employs various methods, depending on the communities associated with the site. This integration has sometimes been difficult to build, so the studio invites guests and incorporates some activities to facilitate collective learning. For instance, guided by Māori professionals and educators, each group of students investigates one aspect of the principles, and shares their knowledge with other classmates. This method is very effective, allowing students to quickly grasp the rich layers of the site and its context. Another method is to actively engage with local communities and Māori representatives. For example, in the 2017 Hīhīaua project, students were welcomed by a pōwhiri (a traditional Māori welcoming ceremony) (100% Pure New Zealand, n.d.) held at the He Puna Marama Trust. The local community and mana whenua played a critical role throughout the design and feedback process.

The framework described above fosters a student-centred, active collaboration between landscape and architecture disciplines. The collaboration strategy, objectives and supporting activities are summarised in Table 2.

Teaching–learning strategy	Design phase	Aims of the collaboration	Activities for collaboration	
			Internal	External
Group-based	Research	Produce one holistic research report, which includes theory and precedent review. Identify the main issues and present potential design strategies.	Group discussion. Oral presentation and peer review. Divide research tasks and synthesise results. Write up the research report. GIS analysis and modelling.	Client briefing. Site visit. Meeting with the 'client' and community. Seminars from practitioners in various disciplines. Māori guest speaker and consultants.
	Masterplan	Reach one collective design decision that integrates both landscape and architecture design strategies.	Share knowledge and ideas through discussion and drawing. Sketch various concepts and co-operative designs. Make physical models to test design ideas. Make design decisions for a masterplan.	Group presentation to the client and community representatives. Respond to stakeholders' feedback. Respond to mana whenua.
Individual-based	Detailed design	Architecture students to design a building to respond to public space. Landscape students to design a public space respond to the adjacent building.	Select and divide design sites from the masterplan. Peer consultation from other disciplines. Peer presentation and feedback. Computer-aided visualisation and presentation.	Individual presentation to the client and community. Presentation to guest critics and respond to their feedback. Respond to mana whenua.

Table 2: Collaboration process in the joint landscape/architecture studio.

RESULTS OF THE MULTIDISCIPLINARY COLLABORATION

The multidisciplinary studio framework has aided collaborations between landscape and architecture students over the last six years. The outcomes can be summarised from four aspects: First, the multidisciplinary collaboration has enabled students to gain a holistic understanding of contemporary problems that are often discussed in practice. Second, the landscape–architecture teamwork has helped knowledge-sharing and an interactive design

process. Third, the student–stakeholder engagement has contributed to integrative solutions beyond stakeholders' expectations. Finally, students have been able to embed Indigenous knowledge through Te Aranga Principles in their design work.

However, the multidisciplinary collaboration has also experienced some challenges. First, preparing a realistic project that fits the studio scope and finding the right client is a big challenge for the teaching team, requiring considerable time and energy. Second, organising student group work requires a knowledge of the students' strengths and skills. Although most groups work well together, some groups have had difficulties in dealing with disagreement and design priorities. Moreover, external collaboration often depends on the stakeholders' time and availability. For example, not all stakeholders have been able to attend students' presentations of both masterplan and the detailed investigations. In addition, despite the efforts to incorporate Te Aranga Principles with help from Māori academics and mana whenua, some students still have difficulties in applying these principles in their design work. For instance, some students from different international backgrounds find their understanding of Indigenous culture is limited.

The sections below summarise the key findings from the studio process.

Result One: Students are able to interact with contemporary problems

Through the engagement with real sites and concerned clients, the joint studio has exposed students to the multidisciplinary, interconnected issues that are typically presented in most landscape and architecture practices. For example, the 2017 Hīhīaua project was initiated by the Momentum North Group, a local community group in Whangārei. The group and communities' representatives worked closely with the joint studio from the first site visit to the final design presentation. Through visiting the site and talking to the clients and stakeholders, in particular He Puna Marama Trust and Te Kopu Pacific Indigenous and Local Knowledge Centre of Distinction, students gained a holistic understanding of both the proposal for a new waterfront development and the flooding threats posed by the effects of climate change. To investigate the impact of flooding on the site, students conducted hydrological analysis at two scales: the catchment and immediate site. After extensive research and mapping, students identified ways to utilise the flooding as an opportunity for waterfront redevelopment.

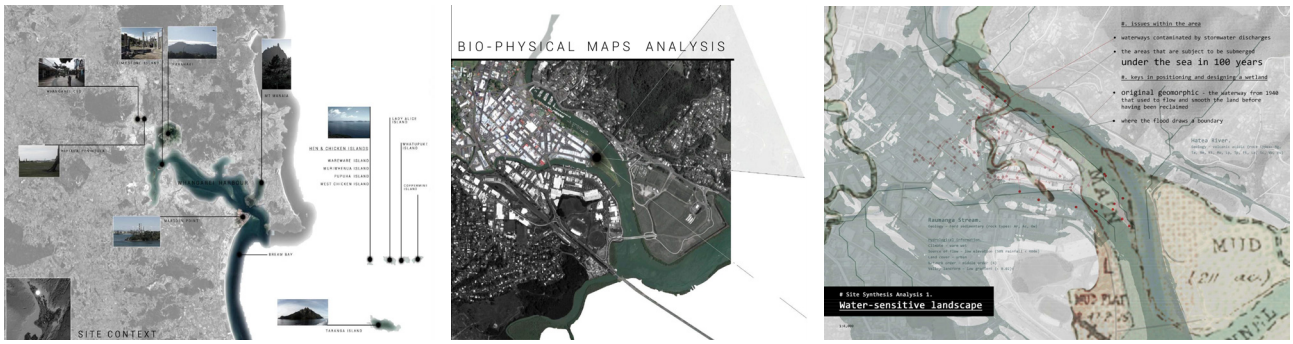

Figure 1. Site analysis across different scales for the Hīhīaua project. Student group: Yamen Jawish, Jill Koh, Sarah Mosley, Wesley Twiss, Yujie Zou.

Another example is the Port of Onehunga waterfront development. The client, Panuku (the Auckland urban development authority), invited the Unitec joint studio to help in the development of their thinking about the future of the port, especially the effect climate change, in particular sea-level rise, will have on the conventional waterfront-development model. Panuku helped in the development of the studio brief, organised the site visit, and took part in key presentations during the design process. The students were expected to tackle the sea-level-rise issue while simultaneously developing a medium-density urban-development programme. Through a serious analysis of rising sea levels, landscape and architecture students were able to integrate adaptation strategies through the masterplan to detailed design phases.

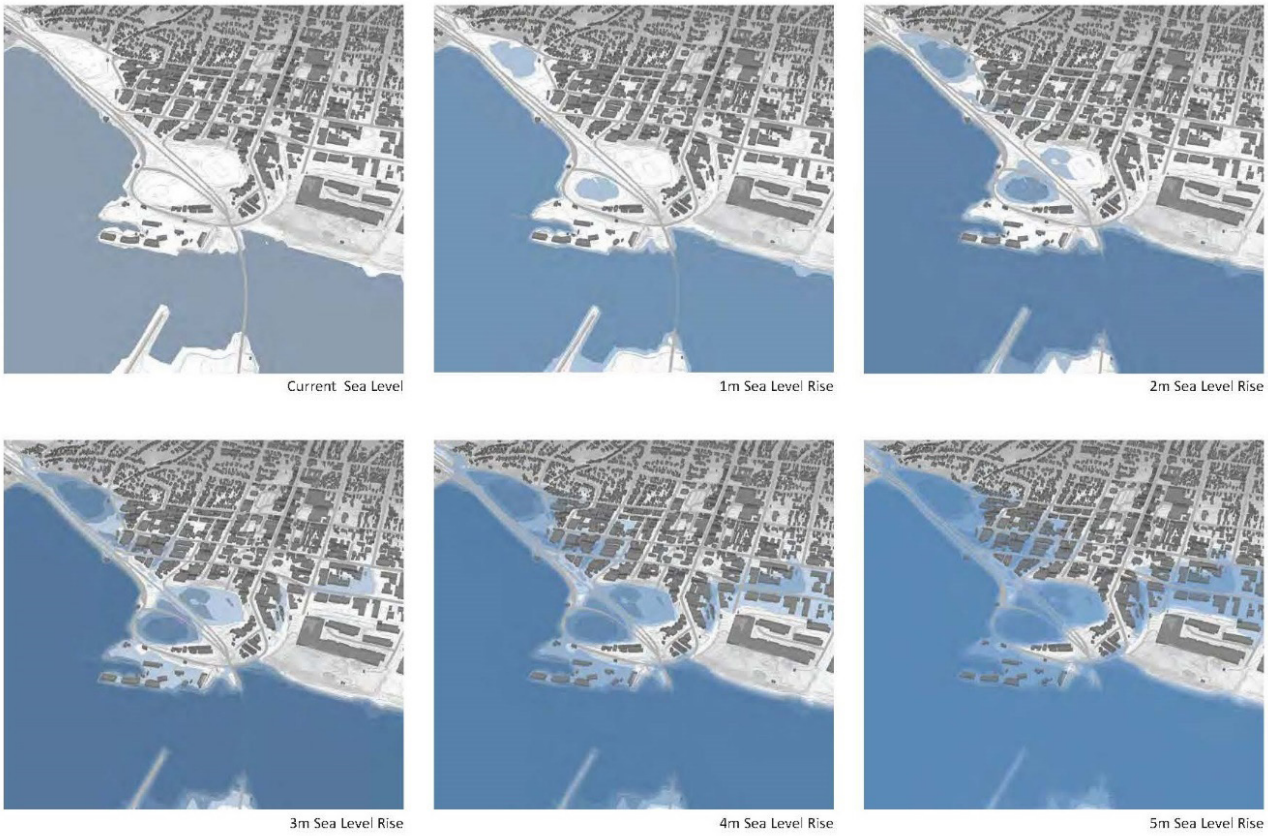

Figure 2: Sea-level-rise analysis for the Port of Onehunga project. Student group: Deepak Badhan, Peter Chen, Suyi Gan, Haiyue Li, Kelsey Stankovich, Yue Yu.

Result Two: Students are able to exchange knowledge and learn from each other (internal collaboration)

The collaboration between students of architecture and landscape architecture aims to explore ways in which buildings and urban spaces together create resilience to climate change. In this way, the different disciplines contribute to finding better solutions by working together. By increasing discussion and teamwork, the specificity of knowledge from each discipline is shared and reconstructed, helping students to learn from each other. The design results show how this collaborative process helps students develop hybrid designs that share features from both disciplines.

Some landscape architecture students have shared their skill in large-scale site analysis, especially using Geographic Information System (GIS) mapping and analysis of the site's topography and hydrology, helping architecture students understand how landform and water flow can impact the placement of buildings. Working with architecture students, some landscape students have developed a deeper understanding of how public spaces are affected by the building's orientation and footprint, helping them to reflect the importance of the built environment.

The use of hybrid architectural elements, such as green walls, green façades and green roofs, shows how knowledge and different views are shared between disciplines, helping the students to learn new approaches and techniques. Architecture students usually define the best location for these elements by considering functional and aesthetic aspects: functions and the use of spaces, materials, structure, climatic conditions and the relationship with the built environment. Landscape students contribute to this discussion by identifying the appropriate species to be used on these vegetated surfaces, considering their maintenance and impact on the biodiversity of the site. Through conversations between peers, constructive conflicts, workshops, sketches and modelling, knowledge is exchanged and constructed throughout the course in the studio environment (see Figure 3).

Figure 3. Activities developed during studios. Photographs: the authors.

Result Three: The student–stakeholder engagement contributes to innovative solutions beyond stakeholders' expectations (external collaboration)

The engagement between students and community members, clients and industry professionals has contributed to the project's development. Traditional lectures with tutors and invited experts in different fields (Māori knowledge, urban design and water management) help students develop research methods. Other activities organised throughout the project have also been essential to expand and unite knowledge between the different groups involved in these projects. In discussions with community members, students have had the opportunity to talk with residents and community representatives, and better understand their aspirations and needs. Presentations in which students show their work to peers, clients (communities or government agencies) and industry professionals have helped provide students with relevant feedback on their ideas.

Over the six years, invited industry critics (architects, urban planners and landscape designers) have commented on the importance of collaborative design work in the urban domain. For example, Christina van Bohemen, past president of the New Zealand Institute of Architects (NZIA) commented: "I think that it's such a good idea to run joint architecture and landscape projects – it's never too early to start working collaboratively!" (Landscape Architecture Aotearoa, 2019). Photographs in Figure 4 show presentations organised in different studios over the years.

Feedback from peers and clients has also contributed to creating a process closer to contemporary design practice and has highlighted the social responsibility students will face in their future careers. Engagement with the community adds complexity to a process that is already challenging for students, making them reflect on the interrelationship of physical, cultural and social aspects in their projects. As one student reflected: "It was definitely a challenge, to find design solutions that would be resilient, achievable, affordable, aesthetic, functional and, more importantly, would suit the community" (Unitec Institute of Technology, 2017).

Student feedback reinforces the importance of community engagement: "Once you realised these people were genuinely interested in your ideas, it's quite rewarding. ... Working on a project like this illuminated some of the challenges we'll be faced with when we enter the workforce" (Unitec Institute of Technology, 2017). Reflections on the experience with one community group reinforce the idea that it is not a unilateral process, and that both parties involved in the discussions (students and community) have benefited. The community comments emphasise that the student projects contributed to expanding their views of the site: "students have presented a truly masterful

Figure 4. Presentations in joint landscape/architecture studios, over various years. Photographs: the authors.

piece of work that far exceeded any of our expectations" (Bradbury et al., 2018, p. 9). Another community member mentioned that students "have done a wonderful service to our city and provided us with so many thought-provoking options. When we first conceived the idea, I think most of that loose group of people known as Momentum North had a very different strategy for the development of the area than we do now, after having had the benefit of your thinking. That is a wonderful success for all stakeholders" (Bradbury et al., 2018, p. 9).

Result Four: Students are able to embed Indigenous knowledge in design work

An important part of the studio collaboration is integrating the Te Aranga Design Principles as part of our obligations under Te Tiriti o Waitangi (The Treaty of Waitangi). Among the seven Te Aranga Māori Design Principles are: mana rangatiratanga (to recognise and respect the authority of tribes); whakapapa (to celebrate Māori names and naming); taiao (to protect, restore and enhance the natural environment); mauri tū (to protect, maintain and enhance environmental health); mahi toi (to capture and express Māori narratives and creative expression); tohu (to acknowledge the wider cultural landscape, significant sites, landmarks); and ahi kā (to endure the living presence – access to natural resources, the guardianship to land) (Auckland Design Manual, 2016). The most frequently used principles have been taiao and tohu, to address climate-change-related problems. Whakapapa, mauri tū and mahi toi have also been used to explore the cultural and historical characteristics of the design site.

Lectures, site visits and workshops with mana whenua have created opportunities for students to acknowledge Māori culture and values (Figure 5). Continuing feedback from mana whenua and community members has helped the students to understand the ways in which critical Indigenous knowledge has been integrated into the design work (Bradbury et al., 2018). Giving feedback on the Hīhīaua project, Tui Shortland, Director of Te Kopu Pacific Indigenous and Local Knowledge Centre of Distinction, commented: "The use of a celestial viewing compass, Te Kāpehu Whetū, in the Pacific Indigenous and Local Knowledge Centre was a successful gesture to integrate the building with the cosmos" (Bradbury et al., 2018, p. 134). A distinguished Momentum North member, Peter Ogle, stated the following: "One of my favourite landscape designs. The forest, medicinal plantings, water filtration and the terraces working as flood defence, but also as a natural draw to the river. Reflecting all the cultures of Micronesia, Melanesia and Polynesia in a marae-style layout, and incorporating the elements of Māui, ika and waka within the framing, worked for me" (Bradbury et al., 2018, p. 134). Figures 6 and 7 are examples of how students have integrated Te Aranga Principles in the design of public space and buildings.

Figure 5: Students engage with mana whenua. Top row, left to right: Tui Shortland, Te Kopu Pacific Indigenous and Local Knowledge Centre of Distinction; Amiria Puia-Taylor, director of The 312 Hub; presentation to Te Warihi Hetaraka, Hīhīaua Cultural Centre Trust. Bottom row, left to right: pōwhiri hosted by He Puna Marama Trust; Tui Shortland critiquing at a presentation at Unitec; students presenting to Whangārei District Council. Photographs: The authors.

Figure 6. Example of how students have integrated Te Aranga Principles in public-space design.
Student group: Aleesha Kumar, Sharon Eccleshall, Shibing Li, Sianne Smith, Vignesh Krishnamoorthy.

This experience has enabled students to create solutions that break down disciplinary boundaries and produce design work that exceeds the stakeholders' expectations. Some informal feedback suggests that the combination of internal and external collaboration may have contributed to creating integrative design solutions that go beyond the conventional boundaries. One of the senior urban designers in Panuku commented: "It was fantastic to see the quality and attention to detail that the Unitec fourth-year students included in their inspiring Onehunga port projects. Particularly, following the development of concepts into detailed plans was outstanding – some of the work even surpassed the quality of work Panuku sees in real-life projects and developments across Auckland" (personal correspondence with the authors, June 8, 2020).

Figure 7: Example of how students have integrated Te Aranga Principles in building design.
Student: Madhuvanthi Padmanabhan.

DISCUSSION

The multidisciplinary approach described in this paper, tested and refined over the last six years, serves as an opportunity for landscape and architecture students to build collaboration capacity, integrate innovative strategies and respond to complex social–environmental issues. Compared with a single-disciplinary studio-teaching approach, the multidisciplinary approach has some unique features that have contributed to the success of the studio.

The use of topical urban projects is important to the success of the studio. Auckland and the greater Auckland region, including Whangārei and Wellsford, have generated many fascinating and critical social and urban issues. These have been caused by the unexpected and unprecedented urban growth in the Auckland region over the last ten years.

A consequence of this has been a debate over the future direction of Auckland's growth (Lowrie, 2014; Nichols, 2016). Should the city concentrate urban growth in the inner city, what we might call the compact-city argument (Auckland Council, n.d.b), or should growth happen in the regions, following Auckland's linear form (Bogunovich & Bradbury, 2012) but concentrating around nodes along this corridor?

In recent years the environmental effects of climate change on the way we develop cities have become more important. For example, an extremely successful urban model, waterfront development, has come to seem less desirable. One of the questions raised in the joint-studio discussion has been what might replace this hitherto internationally dominant urban-development model.

By posing these critical questions, students are drawn into the projects, eager to explore real-world issues. Similarly, stakeholders, such as councils and development agencies, are also attracted by the opportunity that the joint studio presents. By having students explore issues that are very much at the forefront of their minds, stakeholders can see the implications of innovative and collaborative design work. Studio critics, a vital part of the studio process, are likewise engaged by projects that are part of the public discourse. By being engaged in the larger public awareness of a project, the critic brings a more urgent critical engagement with the issues than that shown for more abstract projects.

The use of publication is another important feature of the studios. Requiring students to investigate a site and interrogate the brief is hardly a new technique. But requiring them to examine in a manner that can be collected

and published is an important part of the collaborative process. Forming the architecture and landscape students into groups and giving them specific research goals, such as immediate site analysis, demographic surveys and GIS mapping of the sites, and background research, such as the different urban and housing typologies, helps build a collective knowledge of the site. Requiring each group to prepare a publication document of their research, which ultimately becomes one overall studio document, helps the groups develop co-operative skills in collecting and presenting data. Some students have used infographics to present complex information. Putting together the studio document means the collaborative skills developed in each group are then tested by assembling the meta-document to be published on Issuu (Bradbury, 2016). This then acts as a shared resource for the development of each group's masterplan. In this way, students see the efficacy and value of a collective and collaborative effort to collect as much data as possible, a job that would be impossible to accomplish as an individual.

The student work in the Hīhīaua project followed a similar trajectory, with students forming groups and focusing on disparate site data to bring into a joint publication. However, in the Hīhīaua project, the importance of linking the research with the design work was emphasised. Students were encouraged to prepare their design work not just for a conventional studio presentation and a crit, but also for publication with written commentary. The results include a peer-reviewed academic publication (Bradbury et al., 2018) and two journal articles (Bradbury et al., 2017; Wang et al., 2018). Most recently, outcomes from the Port of Onehunga project have also led to a peer-reviewed publication (Wang et al., 2021).

Publication of students' work, both site research and design, has helped students form collaborative ties and to see and use the results of the joint projects. In addition, the publication of the work has been educative – that is, students have been able to freely use the information to help inform design work – and presentational – a record of these endeavors could be folded into a student CV. In this way, their collaborative research and design work could be seen by future employers as evidence of their engagement with collaborative practice in a real-world scenario.

CONCLUSION

This paper presents the development of a multidisciplinary approach for a joint landscape/architecture studio over six years. The studio framework shared here provides a platform for landscape and architecture students to work collaboratively on a project that is close to professional reality. The four key aspects – working on contemporary issues, collaborative learning, Research by Design and acknowledging mana whenua – enable landscape and architecture students to actively engage with internal and external stakeholders.

Through six years of experimentation, the overall trajectory of the multidisciplinary studio has been positive. The results suggest that multidisciplinary collaboration can foster methodological and analytic interaction amongst the landscape and architecture students. The integrative collaboration enables students to expand knowledge, complement each other's views, become critical of conventional solutions and produce integrated design solutions that break professional boundaries. We suggest that this process has resulted in several unique design strategies that address complex contemporary problems.

We also believe that while the focus of this studio approach is to foster collaboration for landscape and architecture programmes, the collaborative studio framework could also be applied to joint studios for other design disciplines.

REFERENCES

100% Pure New Zealand. (n.d.). *Pōwhiri: A Māori welcome*. https://www.newzealand.com/nz/feature/powhiri-maori-welcome/

Auckland Council. (n.d.a). *Engaging with mana whenua*. https://www.aucklandcouncil.govt.nz/building-and-consents/resource-consents/prepare-resource-consent-application/Pages/engaging-with-mana-whenua.aspx

Auckland Council. (n.d.b). *How Auckland will grow and change – a quality compact approach*. Auckland Plan 2050. https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/auckland-plan/development-strategy/future-auckland/Pages/how-auckland-grow-change-quality-compact-approach.aspx

Auckland Design Manual. (2018). *Te Aranga Principles*. http://www.aucklanddesignmanual.co.nz/design-thinking/maori-design/te_aranga_principles

Bogunovich, D., & Bradbury, M. (2012). Auckland 2040: A resilient urban region on the water. *Planning Quarterly*, *184*, 4–8. https://hdl.handle.net/10652/2166

Bradbury, M. (2016). *Upper Rodney study Unitec 8111 7227*. Issuu. https://issuu.com/bargration/docs/upper_rodney_study_r

Bradbury, M., Melchiors, L. C., Wang, X., & Byrd, H. (Eds.). (2018). *The Hīhīaua studio*. Unitec ePress. https://www.unitec.ac.nz/epress/index.php/the-hihiaua-studio/

Bradbury, M., Wang, X., Byrd, H., & Melchiors, L. C. (2017). Hīhīaua – A Unitec landscape/architecture studio. *X-Section*, *1*, 16–23. https://hdl.handle.net/10652/4298

Carter, J. G., Cavan, G., Connelly, A., Guy, S., Handley, J., & Kazmierczak, A. (2015). Climate change and the city: Building capacity for urban adaptation. *Progress in Planning*, *95*, 1–66. https://doi.org/10.1016/j.progress.2013.08.001

Cerra, J. F. (2016). Inland adaptation: Developing a studio model for climate-adaptive design as a framework for design practice. *Landscape Journal*, *35*(1), 37–56. http://lj.uwpress.org/content/35/1/37.short

Climate Change Adaptation Technical Working Group. (2017). *Adapting to climate change in New Zealand*. Ministry for the Environment.

De Hei, M. S. A., Strijbos, J. W., Sjoer, E., & Admiraal, W. (2015). Collaborative learning in higher education: Lecturers' practices and beliefs. *Research Papers in Education*, *30*(2), 232–247. https://doi.org/10.1080/02671522.2014.908407

De Queiroz Barbosa, R. E., De Meulder, B., & Gerrits, Y. (2014). Design studio as a process of inquiry: The case of Studio Sao Paulo. *Lusofona Journal of Architecture & Education*, *11*, 241–254. https://limo.libis.be/primo-explore/fulldisplay?docid=LIRIAS1954067&context=L&vid=Lirias&search_scope=Lirias&tab=default_tab&lang=en_US&fromSitemap=1

Hauberg, J. (2011). *Research by Design – a research strategy*. Research by Design Conference, Brussels, March 2, 2011. https://adk.elsevierpure.com/en/publications/research-by-design-a-research-strategy-2

Hirt, S., & Luescher, A. (2007). Collaboration between architects and planners in an urban design studio: Potential for interdisciplinary learning. *Journal of Design Research*, *6*(4), 422–443. https://doi.org/10.1504/JDR.2007.016852

Kake, J., & Paul, J. (2018). *Evaluating the application of Māori Design Principles to urban neighbourhood development projects to develop a Kaupapa Māori design framework and assessment tools*. National Science Challenges: Building Better Homes, Towns and Cities. https://www.buildingbetter.nz/publications/urban_wellbeing/Kake_Paul_2018_Maori_Design_principles_UrbanismNZ.pdf

Kim, M. J., Ju, S. R., & Lee, L. (2015). A cross-cultural and interdisciplinary collaboration in a joint design studio. *International Journal of Art and Design Education*, *34*(1), 102–120. https://doi.org/10.1111/jade.12019

Koo, T. S. (2012). *Integrating design disciplines: Understanding the potential for and factors affecting the success of interdisciplinary design education for architecture and landscape architecture* [PhD dissertation, North Carolina State University]. ERIC. https://eric.ed.gov/?id=ED546949

Landscape Architecture Aotearoa. (2019). *Student ideas on developing Onehunga's waterfront*. https://www.landscapearchitecture.nz/landscape-architecture-aotearoa/2019/7/16/student-ideas-on-developing-onehungas-waterfront

Leathem, T., Hillesheim, C., Coley, A., & McGregor, S. (2019). Student and teacher perspectives on a multi-disciplinary collaborative pedagogy in architecture and construction. *Higher Education, Skills and Work-Based Learning*, *9*(1), 121–132. https://doi.org/10.1108/HESWBL-03-2018-0026

Lowrie, M. (2014). *NZ Initiative's ideology short-changes compact city debate*. Greater Auckland. https://www.greaterauckland.org.nz/2014/06/18/nz-initiatives-ideology-short-changes-compact-city-debate/

Miles, M. E. (2018). The collaborative interdisciplinary studio. In A. Frank & C. Silver (Eds.), *Urban planning education: Beginnings, global movement and future prospects* (pp. 269–292). Springer. https://doi.org/10.1007/978-3-319-55967-4_18

Morton, J. (2017, October 26). Climate change: Five ways it could harm us. *NZ Herald*. https://www.nzherald.co.nz/nz/climate-change-five-ways-it-could-harm-us/UVBFLUNMBE2A5XHGP7ZVH4AZKQ/

Ng, V. (2013). Values of learning through "place-making" in the design studio. *Archnet-IJAR: International Journal of Architectural Research*, *7*(1), 86–98. https://archnet.org/publications/6925

Nichols, L. (2016, April 19). Home truths: Arguing the case for urban sprawl. *NZ Herald*. https://www.nzherald.co.nz/business/home-truths-arguing-the-case-for-urban-sprawl/W52I55XIYNICNW6BVA7SRW36HI/

Park, S. (2020). Rethinking design studios as an integrative multi-layered collaboration environment. *Journal of Urban Design*, *25*(4), 523–550. https://doi.org/10.1080/13574809.2020.1734449

Roggema, R. (2017). Research by Design: Proposition for a methodological approach. *Urban Science*, *1*(2), 19. https://doi.org/10.3390/urbansci1010002

Soliman, A. M. (2017). Appropriate teaching and learning strategies for the architectural design process in pedagogic design studios. *Frontiers of Architectural Research*, *6*(2), 204–217. https://doi.org/10.1016/j.foar.2017.03.002

Thead, E. A. (2016). *Sea level rise: Risk and resilience in coastal cities*. Climate Institute. http://climate.org/wp-content/uploads/2016/10/Erin-Sea-levels.pdf

Unitec Institute of Technology. (2017). *Unitec students re-design Whangārei waterfront*. https://www.unitec.ac.nz/about-us/unitec-students-re-design-whangarei-waterfront

Verbeke, J. (2011). Research by Design is up and running. *Architecture & Education Journal*, *65*, 109–119. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.938.3140&rep=rep1&type=pdf

Wang, X., Bradbury, M., Melchiors, L. C., & Byrd, H. (2018). Collaborative student and community design in a time of climate change: Planning a flood-resilient waterfront in New Zealand. *ISOCARP Review 14 – Climate Change Planning*, *14*(1), 42–59. https://hdl.handle.net/10652/4407

Wang, X., Melchiors, L. C., & Bradbury, M. (2021). Onehunga waterfront and climate adaptation. *Asylum*, *1*(2020), 190–199. https://www.unitec.ac.nz/epress/wp-content/uploads/2021/03/Onehunga-Waterfront.pdf

Young, M. F. (1993). Instructional design for situated learning. *Educational Technology Research and Development*, *41*(1), 43–58. https://doi.org/10.1007/BF02297091

AUTHORS

Xinxin Wang is a Lecturer in the School of Architecture, Unitec New Zealand. Prior to becoming an academic, Xinxin worked for two decades in China, in the urban and landscape-design field. Her research interests include climate adaptation, low-impact urban design and integrated green–grey infrastructure. She has given presentations at international conferences and universities, including The University of Sydney and The University of Auckland.

Dr Matthew Bradbury is an Associate Professor in the School of Architecture, Unitec New Zealand, and leader of the Master of Landscape Architecture programme. Building a city that is resilient to climate change is Matthew's primary research area; he has written and presented extensively on this subject, including in a recent publication by Routledge, *Water City: Practical Strategies to Address Climate Change*.

Dr Lúcia Camargos Melchiors is a Lecturer in the School of Architecture, Unitec New Zealand. She received a PhD in Urban and Regional Planning (2019) from the Federal University of Rio Grande do Sul, Brazil. She worked as a lecturer and registered architect in Brazil, and was a member of the Board of Directors of the Institute of Architects (IAB/RS). Her research interests include social, physical and institutional aspects of urban development and planning, on a local and regional scale, comprising housing policies, community action and collaborative design processes.