

Contemporary Design
Education in Australia

Contemporary Design Education in Australia

Creating Transdisciplinary Futures

EDITED BY

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This is a peer-reviewed publication.

This book is dedicated to all our students who have participated in the learning activities described across the book, and to all our colleagues, friends, and families who have supported us.

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Foreword

Dr Brandon Gien

Good design has the power to transform a problem into an innovative solution that will have a positive impact on our lives and our world. Design is a universal process that can be applied to transforming complex systems and services, processes, policies, legislation, digital technologies, and products, as well as the places we live, work, play, and learn. Good design applied in this way is good for business and helps drive economic competitiveness.

At its core, design is a creative problem-solving tool. Design helps us to better understand problems at a deeper, user-centred level and provides a framework to ensure the ‘right problem’ is being solved and then ‘solving the problem right’. A true design mindset embraces multidisciplinary and diversity to align shared goals, unlock deep insights, and deliver memorable, meaningful outcomes that have an impact.

Today, to be a successful business through design is no longer only about ensuring a product or service is functional, aesthetically pleasing or designed for efficiency and productivity. Businesses need to consider design from a much broader context: the digital and non-digital user experience, how they capture value from new services, the impact of Industry 4.0 on their offering and supply chains, circular economy implications, artificial intelligence, and global changes in our climate system – all of which will inform their current and future business models.

In a hyper-connected digital era, there is no doubt the profession of design is also constantly evolving and expanding. Now more than ever, design is being leveraged as a core strategy to give businesses a competitive advantage, with a growing list of top-tier firms embedding design capability as a tool for differentiation and innovation, and a catalyst for change and transformation. Designers are now designing business models, social systems, services, experiences, and innovation agendas. Beyond business, design thinking is being deployed across public and private sectors to help address bigger and more systemic global challenges, including design for circularity and design for social impact.

Solving social and environmental problems is a multidisciplinary exercise that challenges designers, architects, engineers, scientists, entrepreneurs, and our

government and business leaders to think more holistically about our world. With existing technologies and applied design methodologies, we could significantly reduce our carbon footprint and move towards a more sustainable and balanced world.

Increasingly, the design sector is being forced to reflect on what skills designers are missing. With ever-evolving shifts in the globalisation of education, traditional design education is being challenged to keep pace and prepare emerging designers for the real world. While some academic models succeed in equipping our future design partitioners with the skills and attributes needed to succeed in their careers, the current pace of technological advancement is creating a growing gap in the skills they are taught and the skills they actually need.

With all this change, one thing is abundantly clear, the role and importance of delivering quality design education are now more important than ever. We need to rethink and redesign our approach to design education so that it embraces transdisciplinary, inclusive, and collaborative design practices to prepare students for a non-linear design career path.

As Don Norman, director of The Design Lab at the University of California in San Diego, has said, ‘Design is not about interacting with a computer; it’s about interacting with the world. To deal with today’s large, complex problems, design education needs to change to include multiple disciplines, technology, art, the social sciences, politics, and business’.¹

As any seasoned designer will attest to, ‘interacting with the world’ and collaborating with other professions are critical components of any design project and that’s where this book comes in. It explores a number of innovative approaches to design education through interdisciplinary and transdisciplinary learning experiences. The authors provide several team-based teaching experiences that include different disciplines outside of design to create transcendent experiences for students.

The book draws on the experience of academics and design practitioners from Australia and internationally, and reviews transdisciplinary practices in design education as a basis for understanding global needs and trends in higher education. Australia’s highly internationalised design education system creates an interesting context for viewing the application of the transdisciplinary methods and processes proposed.

Diversity in design education and practice is now more important than ever as designers embrace inclusivity and co-design practices, so it is heartening to see the authors explore the interrelations between First Nations perspectives and transdisciplinarity practices in design education. Including First Nations voices in design teaching, curricula and research are essential, and the authors explore ways

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to work together respectfully with First Nations partners to embed principles of respect, inclusivity, and cultural competence.

There is no doubt we are experiencing a paradigm shift in the approach to teaching design in higher education – the timing of this book couldn't be better. It is clear that if the future of design education is to flourish, it must embrace elements from multiple disciplines (multidisciplinarity) and blend these interactions to create meaningful cooperation (interdisciplinarity) to provide impactful outcomes to complex problems and challenges (transdisciplinarity).

Contemporary Design Education in Australia: Creating Transdisciplinary Futures has the potential to inform practices within our design education system for the better so that it will have a positive impact not only on our future generation of designers but also on the important roles they will play in their careers as design changemakers.

If ever there was a time to use all the tools in the design box, now is that time. As our world grapples with the ongoing impact of a pandemic, our ability to adapt and generate effective design-led solutions will not only determine our survival but shape the future of business, society and our fragile environment.

Dr Brandon Gien CEO
Good Design Australia
August 2021

NOTE

1. Akawi, Yazan (2017), 'The future of design education is ... no design education: The modern designer has a breadth of experiences not degrees', Inc.com, 22 August, <https://www.inc.com/yazin-akkawi/the-future-of-design-education-is-no-design-educat.html>. Accessed 27 August 2021.

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While creating this book, we have navigated numerous national and global disasters, including Australia's Black Summer bushfires (2019–20), the global Covid-19 pandemic (2020 onwards) and, most recently, the catastrophic eastern Australian floods (2022). All of these events have had a direct impact on both our local community and the global communities with whom we have worked. We recognise the impact that these events have had on people, livelihoods, animals and their habitats, in addition to the environment. Applying a transdisciplinary approach to design learning is critically important if we aspire to challenge and equip our students to respond to these events.

CONCLUSION



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Working towards Transdisciplinary Futures: Complexities and Concepts in Education

*Deanna Meth, Lisa Scharoun, Philip Crowther, Müge Belek Fialho
Teixeira, Dean Brough, and Lindy Osborne Burton*

Hargreaves argues that the ‘responsibility of educators is to ensure that today’s students are ready to live, learn, work, and thrive in this high-tech, global, highly participatory world’ (2010: 348). While the role of higher education is the key in supporting the acquisition of twenty-first-century skills, it is also incumbent upon educators to ensure that students are well placed to understand and critique the wider contexts within which they live and work, including the impacts of both their lifestyles and professional livelihoods on society and the planet. Embedded into a program of study, twenty-first-century skills, represented more broadly in the four Cs of creativity, critical thinking, communication, and collaboration (NEA 2012), can foster students’ capabilities to manage the increasingly complex issues facing us today. Additional to the four Cs, students need the skills to retain, curate, and make sense of immense amounts of information, and they must be prepared with a skill set that allows them to address contemporary challenges, such as global warming, pandemic diseases, financial meltdowns, and political unrest.

Skills can be defined as the outcome of gaining individual components of a program of learning or training that enable us to solve a problem, while knowledge is the component of learning that helps us to recognise the underlying structure of a problem. Skills and knowledge do not, however, operate in a vacuum – they are intertwined, and also can be wielded in both positive and negative ways through capabilities – the key to the triad of ways of knowing, acting, and being (Barnett and Coate 2005: 63) and intrinsic to the way in which individuals understand themselves and behave towards others. Transdisciplinary educational approaches

are arguably key to addressing this scope of needs in a changing landscape, to help meet student, industry, societal, and planetary needs.

This book has explored a considerable range of approaches to encourage and effect transdisciplinary education. Examples have encompassed design-related disciplines at the core of most collaborations (from fashion, industrial design, and visual communication to architecture) in combination with many other disciplinary areas, including education, culinary science, human and social sciences, ergonomics, and media production, and across a variety of professional practice contexts that themselves demand disciplinary diversity.

The introductory chapter set the scene for the contexts, scope, and scale of approaches captured across the chapters, as well as the necessary conditions for designing effective transdisciplinary curricula. These are noted once more here for reference, and to further extend from below:

Designing effective transdisciplinary curricula requires transdisciplinarity to:

- be deeply embedded in and across the curriculum and implemented in different ways at different stages of students' learnings;
- respond to 'wicked problems' typically not able to be addressed by single disciplines alone;
- take place through collaborative, authentic, and experiential learning, which may also be project, problem, or process-based;
- be situated within or integrated with local or global professional workplace or educational contexts.

In contrast, drawing on cases across the book, this concluding chapter seeks to advance conversations on transdisciplinarity in two ways. First, we offer a summary of the complexities in developing and delivering transdisciplinary educational approaches detailed across the book – complexities that in themselves mirror the 'wicked problems' we aim to solve through transdisciplinary education, and for which there are no easy answers. These complexities include the tensions surrounding disciplinary identities and views on the purpose of education, as well as the messiness of administering and operationalising transdisciplinarity in learning and teaching.

Readers noting these complexities might be forgiven for feeling daunted. So, to move discussions towards a more positive and productive space, the latter half of

the chapter seeks to advance the conversation by offering a collation of theoretical concepts and frames referred to across the book that aid in making sense of transdisciplinary undertakings. These theoretical concepts and frames are additional to the necessary and more widely accepted conditions noted above. Read together with the introductory chapter, this chapter gives a comprehensive set of both practical and theoretical aspects to consider when implementing new transdisciplinary innovations in their own unique contexts or considering approaches and issues arising in their own existing practices.

Complexities in aiming for transdisciplinary education

The introductory chapter notes the confusion around terminologies in this space, and how, in reality, many intended transdisciplinary educational experiences remain only partially realised, or merely aspirational. In transdisciplinary research spaces, on the other hand, flexible and permeable boundaries are necessary and welcomed, and investment of funding and time to the endeavour is more overt. This is seen coupled with clearer aspirations and understanding of the advanced knowledge and contexts of all parties in the collaboration. Arguments have been made that transdisciplinary work is more appropriate where higher-level knowledge is brought to the table – many scholars and practitioners feel it is not possible in undergraduate educational spaces (Millar 2016: 479). As highlighted in Chapter 5, Cooper et al. (2005) believe that earlier introductions are important before professional doctrines negatively impact students' learning, and we would argue similarly.

How might we put a finger on what is being aimed for educationally and why transdisciplinarity is required at all? Countless references across chapters cite the imperatives for a future-focused education driven by global challenges that can no longer be solved by single-siloed disciplines. Alongside this, lies the need for collaborative and deep-level genuine learning interactions, in experiential, real-world contexts. As noted earlier, underpinning this learning is the requirement for students to have a critical understanding of themselves and others, diverse contexts and positionalities so as to inform the design challenge at hand. This is more than knowledge and skills – a mindset or capability that helps to bring students and staff to the 'transdisciplinary conversation' or, as Escobar (2018) has described it, the need for designers to contemplate the 'praxis of our living'.

Recognising the space and flexibility needed in transdisciplinary learning, an important point to consider is whether we have educationally backed ourselves into a corner through the rigidity of the structures now surrounding learning and teaching. David Boud, in his foreword to Nelson (2018), summarises a

conversation that has been bubbling in higher education circles for a while. That is that higher education reforms over the past 30 years, supported by constructivist theory, have rendered learning experiences ‘mechanistic’. The prioritisation of learning outcomes, assessments mapped to these and rigid marking rubrics are felt by Nelson to all be barriers to creativity. Blum and Kohn (2020), part of the ‘ungrading’ movement in education, explain the ways in which many now believe that rigid rules in assessment are undermining student learning. Taking a post-constructivist perspective, Nelson notes the need for space for an ontological emphasis, integral to the ‘learner’s sense of self’ that does not stifle creativity, imagination, and potential. This sense of self also draws on the work of Paulo Freire (1993) and his notion of independent self-consciousness in which students take responsibility for themselves. In some ways, this is not dissimilar to the praxis asked for by Escobar (2018) above. Transdisciplinarity, on the other hand, has been shown to demand approaches that push and, in some instances, reset or circumvent these limits. Aiming to support risk-free spaces for assessment, and offering freedom for students to experiment with ideas, Chapter 2 noted the move away from graded assessment in the impact lab units. Now also challenging higher education is the dominance of western teaching systems and with this a fixed and measured way of teaching, learning, and assessment (raised in Chapter 6). It is important to recognise that it is not only the curriculum that requires decolonising, but the systems and structures through which curricula act.

Beyond within-course transdisciplinary curricula and pedagogies, we have noted students’ large uptake of double-degree options, and the potential for spaces of innovation between two discrete disciplines. But, along with most, we have observed that crossovers between the two degrees are generally not capitalised on – a common pitfall of double degrees, where they are often administered in isolated ways, much to the frustration of students (Russell et al. 2008). Instead, we rely on students to make those connections, and any studies that looked at how or if students bring their knowledge and skills acquired external to design to bear on such work would be very useful. Interwoven with the above, and exacerbated by the Covid-19 pandemic, the shift to modes of online learning has heightened the complexities of enabling students to interact collaboratively, in particular, where, related to design, tangible ‘making’ activities and experiences of design cannot only be in digital forms. Replacing experiences of physical travel, boundaries have been pushed and cross-cultural experiences have been shown to be possible in online interactions across global divides.

We recognise, however, that beyond the obvious benefits of collaboration and students learning to work with diverse perspectives, there are limited studies on the educational benefits of attempts at transdisciplinarity related to any actual ‘transdisciplinary’ outcomes in students’ earlier years of university study. Cases

across this volume are an attempt to capture the multitude of ways in which transdisciplinarity might enrich students' learning and development, particularly in the undergraduate space.

Student and staff attitudes and understandings

Various chapters have highlighted the range of ways in which staff attitudes to interdisciplinarity and transdisciplinarity can make or break such work. It would be unfair to describe any resistance to the transdisciplinary endeavour as merely a resistance to change. The 'zones of influence' on curricula (Barnett and Coate 2005) have been considered in relation to Queensland University of Technology design courses by Meth et al. (2021: 250) and evidence of the wide range of stakeholders with expectations of and influences on curricula. Transdisciplinarity in undergraduate education brings with it genuine concerns about what is educationally possible or necessary and, for many, the sense that disciplinary knowledge and skills are crowded out of a curriculum that is seen to be increasingly genericised. Some of this has been discussed in Chapter 3.

Disciplinary objections and demands emanate from disciplinary traditions, many of which also link to professional accrediting bodies that rely on curricula to teach specific externally defined learning outcomes. For example, Chapter 11 has noted the traditional process-based learning and practice model aligned to entering design professions (Muratovski 2019) that, while ever it remains entrenched, does not move the profession forward to meet the needs of the future. Colleagues in some professional spaces, such as the health sciences, might argue that there should not be a requirement for new knowledge, but rather inter- or multidisciplinary opportunities where one's knowledge and professional expertise remain the focus of the collaborative working relationship. This would play out, for example, in a health-care setting, where an integrated health-care approach to complex cases and situations is expected.

For a range of reasons, students may arrive at university set on focusing on a single discipline only. This may partly relate to received career counselling, which sometimes focuses on traditional study and career pathways, such as teaching, engineering, or optometry, or simply students' own attempts to match to subjects directly from what they know of school subjects. We have witnessed students who resent being asked to work outside their disciplinary siloes. But the increase in the uptake of double degrees evidences an appetite for students to study and work across disciplinary spaces. There is, however, more to be done to provide undergraduate students, in particular, with a sound rationale for why transdisciplinary experiences are important. This also strengthens calls for better evidence of educational successes related to transdisciplinary learning, as well as openness about what is not possible to achieve.

Ownership, systems, and structures to enable transdisciplinarity

In our collective experiences, a large and as yet unsolved ‘elephant in the room’ concerning transdisciplinary educational activities relates to their ownership, and to the systems and structures that exist to best enable them. Russell et al. (2008) note how universities are simply not structurally set up to deal with the requirements of transdisciplinary developments. Beyond the cultural obstacles alluded to above, the way in which disciplines are clustered, the broader units into which academic schools are placed (in our instance denoted ‘faculties’) are often also the level at which financial and administrative planning takes place. They are the place where, because of financial and administrative responsibility, leadership, course ownership, academic appointments, reward and recognition, workload allocation, managing timetables and teaching facilities also must reside. This does not work for a course whose core aim is collaborative learning across faculties, and it remains at odds with the level of investment in transdisciplinary research in comparison. We acknowledge that this is not a simple fix and have also noted that in rare instances when a course manages to break free of disciplinary boundaries to institutional ownership, issues arise of ownership, academic buy-in, and financial and systems complexities when, as noted, these are within the power of the faculty disciplinary spaces.

And small, for example at the level of an individual unit, does not necessarily mean easier – this book evidences the key takeaway that a change in the scale of a learning experience does not always negate the complexities of more local transdisciplinary endeavours. For transdisciplinary learning encompassing external collaborations (and by virtue of the real-world challenges being addressed, this is the case for many examples across the book), support and enablers for this nature of work are seen to fluctuate greatly. Organisational and administrative requirements for fostering and sustaining working relationships and/or learning that takes place off the institutional ‘site’ are extensive, and the risks and complexities are greatly magnified in comparison to learning ‘on site’. Chapter 7 explores some of these in relation to study tours. Also, beyond the institutional bounds, Chapter 4 highlights the difficulty in achieving consistent experiences for students undertaking internships and service learning where, although the sites may offer the potential for rich transdisciplinary experiences, this is often not achieved in practice. This relates also to ensuring continuity of partner resources and time, and the administration of such partnerships. The importance of a sound academic team that is able to bring this consistency has been noted, often making work-integrated learning that is embedded, owned and managed from within the university a more viable option.

The fact remains, however, that we have rich and transformative stories to tell about transdisciplinary experiences. So, clearly, something is working, and the

issues above have, to some extent, been overcome to enable their delivery. The major factor that underpins all issues highlighted here relates to institutional abilities to undertake and support transdisciplinarity *in an ongoing way*, for consistency and repeatability. At the very least, the ability to repeat, evaluate, iterate, and consider deeply what works and what does not in transdisciplinary practices is key. Across the sector, there is a general reluctance to hang out the dirty washing of failures in this space, but anecdotal evidence from universities in Australia and globally points to countless (sometimes very costly) short-lived attempts at transdisciplinarity in education. In these attempts, instead of recognising the complexities from the start – stable leadership, championing, structures and commitments to see developments through and beyond the first iterations – what is witnessed is the quiet receding of what may have been genuinely sounding transdisciplinary learning experiences. This is a sad indictment of institutions that might pride themselves on evidence bases and research to back up their endeavours – and something we have yet to properly crack in the higher education space.

Conceptual frameworks for transdisciplinary education

This section synthesises the broad range of theoretical constructs offered by various chapters that help to broach the complexities faced in developing and delivering transdisciplinary education. We divide these constructs into three sections. The first covers the considerations that might precede or give grounding to transdisciplinary intentions. The second explores ways of articulating and theorising about the transdisciplinary space and activities. Last, extending on the conditions stated at the opening of this chapter, we offer a range of concepts relating more directly to transdisciplinary curriculum and pedagogies.

Opening conceptual considerations

Mirroring the complexities of what is desired or educationally possible, an opening frame for any transdisciplinary work includes questions of ‘value’ (raised in Chapter 8), working ‘ethos’, and ‘impact’ (introduced in Chapter 2). Foregrounding any transdisciplinary work is a shared educational aim, within this an understanding of the value of the transdisciplinary undertaking, and consensus on the nature of intended impacts.

Knowing from the outset that there is the potential to break beyond single layers of reality (disciplinary siloes) offers immediate hope for transdisciplinary education. The introductory chapter discusses the concept of ‘levels of reality’ (Nicolescu 2012: 20) where transdisciplinarity enables new levels of reality and new future

worlds, with a structure of reality that is multidimensional and multi-referential. This new level of reality is unlike multi- and interdisciplinary practice where innovations remain in specific layers of reality.

We have identified three important frames for transdisciplinary work: that knowledge systems are constantly evolving; that they are culturally embedded and dynamic (Nakata 2002: 6); and that Indigenous knowledge transcends transdisciplinarity by virtue of intrinsic multiple realities, as proposed in Chapter 6. In this chapter, Renata et al. offer a way to better situate the entirety of any transdisciplinary work that from the outset requires all parties to better understand the perspectives and context from which they are bringing their knowledge, and better enable how it may therefore be shared and valued. This notion is also embodied in Escobar (2018) plea for designers to understand the ‘praxis of our living’ discussed earlier.

Concepts that help disciplines to find new common ground

Notions of perspective (Coxon 2015) and the ways in which students interpret situations and consider themselves in them are important, as discussed in Chapter 3. This foundation brings strength to students’ ability to work with others across disciplinary boundaries. Also discussed by Swann in Chapter 3, interdisciplinary perspectivism encourages an understanding of differences and similarities across disciplines through the value of recognising multiple perspectives (Pratt 1998: 34). Framing transdisciplinary collaborations through such lenses can aid staff and students in interpreting and reframing knowledge relative to others, enabling them to find common ground. This is noted by Swann as key to students buying in to an interdisciplinary way of learning and making. Swann also makes the point that the design process in itself offers a vehicle through which to find common ground.

Several conceptual frames have been offered through which to consider how disciplinary knowledge function and come together in transdisciplinary spaces. The introduction poses the concept of consilience (Wilson 1999: 8), the integration of knowledge that takes place through establishing connections between facts, and theories based on facts, pervading all the various disciplines and generating a common base for explanation. This is one way to go about finding the common ground noted above. Another is proposed in Chapter 5 that of Birkeland’s (2002) systems-design approach that challenges traditional divisions between the social and physical sciences. It is proposed that, in doing this, spaces are opened for the integration of knowledge that might be applied to complex ecological and social challenges. Chapter 10 introduces the concept of transvergence, a design methodology that allows the emergence of creative concepts through a process of subverting disciplinary norms by derailment, hybridisation, and speciation (Novak 2002).

Transvergence offers a way to bring a breadth of cultural perspectives and disciplinary practices together in order to navigate a complex problem or set of problems. Drawing on threshold theory, Land (2012: 177) notes that provoked by ‘troublesome knowledge’, disciplinary-minded ‘tribal’ academics need to pass through a liminal phase with a weakening of disciplinary identity to achieve conceptual integration and define new conceptual territory. And this would be similar for students undertaking transdisciplinary collaborations. Though one might argue, in an undergraduate space particularly, where disciplinary identity is not yet as strong, that this phase will play out differently. Again, this highlights the need for research into the nature of any new ‘conceptual territory’ realised.

Ultimately, as noted in Chapter 10, what is aimed for is the need for complete deterritorialisation (Deleuze and Guattari 1999) and the recognition from all parties in the collaboration of the importance of ‘co-dependence’ (Jimenez-Eliaeson 2017: 39). This is highlighted in Chapter 5 by Burton and O’Gorman as the most distinguishing feature of transdisciplinary collaborations, and one that sets them apart from interdisciplinary and multidisciplinary work, and the positive educational implications to be gained are detailed in their chapter.

Concepts for curricula and pedagogies

Framing our work in this space is important, but helping students to make sense of transdisciplinary ways of working, grounding their work and making them aware of the affordances of such work is key. Beyond what has already been discussed about the solid foundation necessary to foster collaborative approaches, such as co-design or participatory design and problem-oriented, experiential or real-world learning in diverse contexts, the points below serve to deepen the way in which students confront transdisciplinarity and might navigate such learning experiences to achieve the most positive educational outcomes.

Transdisciplinary working is not necessarily something that comes easily to students. It is certainly not something that students in their early years of study – in most instances enrolled, with fairly narrow disciplinary intentions and limited disciplinary knowledge and skills – can fully grasp. McGregor’s (2017) transdisciplinary ‘habits of minds’ is a key concept to aid in this work. The essence of this concept is that in education, introducing and developing students’ understanding of and appreciation for transdisciplinary ways of working needs to be staged and repeated so as to become ‘habit’. It needs to be gradually introduced, repeated across students’ programs of study, and steadily ask more of students academically as they develop their knowledge, skills, and identities. In this way, students’ developing identities are also shaped by and through their experiences in transdisciplinary learning experiences, and they are able to integrate such multiple levels

of reality more naturally. This integration can only be achieved through curriculum-wide conversations on where and how transdisciplinarity is embedded and, given tensions noted above, should sit alongside overt understandings of where and how space for disciplinary depth is also developed.

Shahjahan et al. (2022) offer a comprehensive background on the rationale and imperatives for decolonising curricula and pedagogies, as discussed in several chapters of this book. They note the ways in which this agenda is interpreted and how intrinsic notions of fostering relational approaches (not dissimilar to the necessary multiple realities discussed above and notions of Indigenous knowledge transcending transdisciplinarity), as well as questions of positionality. Several chapters highlight the importance of positionality disclosure in this space. Chapter 6 notes how critical it is that staff, students and community and industry partners are transparent about their own positionality and what they bring to the transdisciplinary relationship. This links to notions of values and ethos introduced earlier. Ensuring there is an activity in the curriculum that offers space for students to look within themselves and to better understand what contribution they can make to the collaboration is important. Chapter 10 notes how a designers' world-view (or *weltanschauung*) (Rittel, in Buchanan 1992: 16) will define the way in which they are able to tackle design challenges.

Understanding their positionality, and the views and perspectives of others, helps to foster students' capabilities to relate and work more effectively across cultures. Several chapters highlight the fact that learning taking place in a cross-cultural setting or with multicultural student groups does not necessarily presuppose students will develop cultural intelligence and an ability to safely and sensitively work across cultural contexts. Wood and St. Peters (2013: 561) note that cultural intelligence includes areas of metacognition, cognition, motivation, and behaviour. Collectively, cultivating students' understanding of the concepts discussed above through curricula and pedagogies will contribute to their overall understanding of the 'praxis of their living' (Escobar 2018).

Chapter 9 highlights the importance of students having an understanding of discipline frameworks in relation to their professional practice and the hybrid forms now required (Dykes et al. 2009). This also links to the need for students to embrace wider 'Communities of Inquiry' approaches (Swan et al. 2009) and understand the necessary 'web of partnerships' (see Chapter 4) that are critical to these new ways of learning and working successfully, regardless of the nature and scale of the workplace. It is further noted that online communications technologies play a crucial role here. Chapter 4 also elaborates on the concept of 'legitimate peripheral participation' (Lave and Wenger 1991: 40) that specifically explores and links communities of practice and transformative learning in workplace learning contexts – key for the ways in which students might make sense of their

participation in work-integrated learning. To fully enable students' engagement and active participation in such learning communities, Baron and Corbin's (2012) definition of student engagement drawn on in Chapter 5 is useful. The definition notes that a positive, fulfilling, and work-related state of mind; vigour, dedication and absorption; and a sense of active participation in the learning community are three essential aspects to students' engagement in learning.

The Delahaye (2011) seven-step framework is one way to ensure that students are able to self-assess and reflect on all stages of 'the learning project'. The framework offers learners a route by which they might reflect on their interactions and development beyond their disciplinary spaces, in terms of knowledge, skills, and capabilities, including drawing out their world-views, positionalities, and any complexities encountered or rewards gained through transdisciplinary interactions. There are many such frameworks – the key being that students should be enabled to make sense of their learning, design processes, collaborations, and impacts.

Table 13.1 summarises these key conceptual elements, offering a reference point for readers.

Concluding points

This book has offered examples of design educational approaches that seek to foster spaces for transdisciplinary practices and approaches to emerge and evolve across a range of scales, both locally and globally. While focused primarily on practices connected to academics in a single institution, the strength of this lies in the plethora of approaches to the transdisciplinary project, and the scope of collaborations, at other Australian universities and in universities and design schools globally. Moreover, as a collection, examples reveal the breadth present in such a space of disciplinary, cultural, and national backgrounds, and this too is evident in the variety of underpinning conceptual frameworks offered to consider our work. In turn, this brings a diversity to the educational experiences of students. For authors contributing to the book, it has also been a collective 'coming to know' and understanding each other's beliefs and approaches to education – an important act in itself for future transdisciplinary work in both teaching and research spaces.

The examples discussed in this book provide evidence of what can be achieved using transdisciplinary approaches and showcase a foundation on which to build. Approaches show how individual disciplines might be transcended, and we acknowledge that this has been achieved to varying degrees across the chapters, with genuine transdisciplinarity remaining aspirational in some areas. It is essential that transdisciplinary learning activities are founded on evidence-based

TABLE 13.1: Summary table detailing key concepts and frameworks related to theorising and actioning transdisciplinary education introduced across this book.

Stage of work	Concept or framework	Reference
Opening considerations	Levels of reality	Nicolescu (2012)
	Knowledge systems as culturally embedded, dynamic, and constantly evolving	Nakata (2002)
	Independent self-consciousness	Freire (1993)
	Indigenous knowledge transcends transdisciplinarity	Renata et al., Chapter 6
Finding common ground	Perspective	Coxon (2015)
	Interdisciplinary perspectivism	Pratt (1998)
	Consilience	Wilson (1999)
	System design	Birkeland (2002)
	Transvergence	Novak (2003)
	Threshold theory, through a liminal phase to a new conceptual territory	Land (2012)
	Deterritorialisation	Deleuze and Guattari (1999)
	Co-dependence	Jimenez-Eliaeson (2017)
Concepts for curricula and pedagogies	Transdisciplinary ‘habits of minds’	McGregor (2017)
	Decolonising curricula and pedagogies and encompassing positionality disclosure	Shahjahan et al. (2022)
	Weltanschauung (philosophy or world-view)	Rittel in Buchanan (1992)
	Cultural intelligence	Wood and St. Peters (2013)
	Praxis of our living	Escobar (2018)

(Continued)

TABLE 13.1: Summary table detailing key concepts and frameworks related to theorising and actioning transdisciplinary education introduced across this book. (*Continued*)

Stage of work	Concept or framework	Reference
	Understanding discipline frameworks in relation to professional practice	Dykes et al. (2009)
	Communities of inquiry	Swan et al. (2009)
	Legitimate peripheral participation	Lave and Wenger (1991)
	Student learning engagement	Baron and Corbin (2012)
	The learning project and self-assessed reflective practice	Delahaye (2011)

research to avoid disciplinary bias and to deal with complex pedagogic challenges. We acknowledge that further exploration of more complex and diverse disciplinary combinations over a longer period of time, and, through a longitudinal study, is required to extend this discussion.

From the outset of the book, a light has been shone on the many challenges faced in the transdisciplinary education space. Some examples highlight issues about authenticity, disciplinary identity, and finding common ground. While these are real, the shared endeavour across cases, and the relative successes evident, offer cause for hope that (a) the endeavour is worthwhile and necessary, and (b) there are ways to move beyond the challenges for successful and impactful educational and community partner outcomes. Transdisciplinary education comes with the risk that must be managed across a range of contexts and, as part of this, the curriculum must remain fluid and responsive to shifting imperatives, taking into account both prospective and current student needs, as well as industry and community needs.

In summary, as the examples across this book show, we believe that transdisciplinarity requires a non-confrontational approach with a united vision in which accountability is shared; a community of practice based on principles of reciprocity. Further to the themes already discussed, transdisciplinarity can be difficult to ‘sell’ to students and some academic staff, but that does not absolve educators of their responsibility to ensure such learning takes place. Through institutional support, in conjunction with genuine and authentic partnerships with students, industry, and community, a shared accountability and a clear and explicit vision can be achieved to advance transdisciplinary and multidisciplinary design-based offerings.

We believe that transdisciplinarity provides a unique and exciting way forward, to address the complex global challenges that our students now face and will continue to face in the future. We hope that this book provides a catalyst for a broader discussion on the possibilities of transdisciplinary education, and design education in particular.

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Contemporary Design Education in Australia

This book offers a range of approaches to teaching higher education design students to learn to design collaboratively and creatively, through transdisciplinary, multidisciplinary, cross-disciplinary, and interdisciplinary learning experiences. It highlights that the premise of traditional disciplinary silos does little to advance the competencies needed for contemporary design and non-linear career paths and emphasizes the importance of higher education being responsive to changes in society, including fluctuating market demands, economic variations, uncertainties, and globalization. Chapters highlight approaches that address this changing landscape, to meet student, industry, and societal needs and reflect a range of design education contexts in which the authors have taught, with a focus on experiences at the Queensland University of Technology (QUT), Brisbane, Australia. Contributions also include collaborations and comparative discussions elsewhere in Australia and globally, including Europe, Asia, the Middle East, and the United States.

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