DESIGN WITHIN SUSTAINABILITY:

Identifying processes and approaches that build capacity and capability for incorporating sustainability within the teaching and practice of design

By

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A thesis submitted to the
University of Otago
in fulfilment of the requirements for the degree of Doctor of Philosophy

University of Otago
2012
This thesis is concerned with semantics associated with ‘sustainable design’. In particular, I focus on how differences in conceptions of design and sustainability can affect the teaching and practice of design. Considering that designers shape and make the artificial for consumption and disposal, how can an exhaustive use of resources and excessive production of waste be sustainable? Consequently, I interviewed some leading global researchers, educators and practitioners in sustainable design, specifically asking what sustainable design means, how they teach and implement it, and why. New ways of thinking about sustainability and design have overtaken the reductionist approach affiliated with the environmental movements of the 1970s, and now include concepts, such as systems thinking, transdisciplinary design dialogues and citizens as co-designers. My intention shifted to discover if these progressive international understandings, approaches and rationale were reflected in design education and practice in Aotearoa/New Zealand.

Using a qualitative and pragmatic grounded theory approach and constant comparative analysis methodology, I sought strategies of how sustainable designers overcame obstacles to the inclusion of sustainability in their disciplines. I propose that through more global ways of thinking about design can come broader ways of thinking about sustainability. I build on many current conceptions of sustainability education and sustainable design theories to reflect on how designers and educators are some of the most active contributors to social, environmental and economic change. Moreover, I suggest that a failure to recognise the complexities of sustainability can lead to single-issue ways of thinking that can restrict progress towards designing more sustainable futures. In this way, barriers such as a lack of understanding, confidence, importance and support emerge. In contrast, for designers (teachers and practitioners) and educators (from a wide variety of disciplines), recognition of shared common elements between sustainability and design, and sustainability and education can augment current practices and lead to opportunities for engaging in a wide variety of ways towards designing scenarios for more sustainable futures.
ACKNOWLEDGEMENTS

The completion of my thesis would not have happened without some key people advising, reading and supporting me through this process. So there are a few individuals I need to personally acknowledge:

Hugh Davidson, your never-ending confidence in me (and the delicious coffee) has given me the strength to persevere, thank you.

Dr. Michelle Thompson-Fawcett, you are a knowledgeable, thorough and patient supervisor, thank you.

Dr. Carol Bond, from the Student Learning Centre, your assistance was timely and invaluable, thank you.

My wonderful interviewees, you all opened your doors and shared your immense knowledge and passion with me, without you I would not be here, thank you.

Dr. Emma Dewberry, you inspire me and I thank you for having time for me.

Dr. Samuel Mann, thank you for listening, sharing and collaborating.

Associate Professor Philip White and Associate Professor Brian Burns, thank you for opening your homes to me when I was so far away from my own home.

Dr. Cris DeGroot, Professor Kerry Shepherd and my esteemed colleague Nick Laird, thank you for your advice and help in setting me off on this journey.

Bill Currie, Megan, Lani, Caro, Lucy, Claire and Tom over the years you have all read and commented on draft chapters, I really appreciate your time and thoughts, thank you.

Dr. Jonathan West, your meticulous proof reading was welcome, thank you.

Jill and Laurel, and all the rest of my wonderful friends, thank you for the much needed hug, shoulder, ear, walk, coffee or party when I needed it. You inspire and motivate me!

Katherine Twaddell, your plan worked! Thank you for sitting down and working it out with me. Nadine and Jo, I love you and just knowing you were rooting for me got me through.

My new friends at EDC, Otago Polytechnic, thank you for looking out for me, for caring and for being such an inspirational bunch, I hope I can work with you more in the future.

Mum and Dad, you are always so hugely supportive of everything I do, thank you for encouraging me through this crazy endeavour.
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Introduction

Design is ubiquitous! It is difficult to experience anything that is not affected by design. In current Western cultures it is suggested that design has “replaced nature as the dominant presence in human experience” (Buchanan & Margolin, 1995, p. xii). This view advocates how ‘nature’ can be “engineered and manipulated at an astonishing level of subtlety to serve human purposes” (ibid). Every object, every human-made system has, to some degree and at some point, been through a design process – from conception to production. A short list of everyday interactions with design starts from the moment the bed is left, and may include: toothbrushes used, clothes worn, carpets walked on, homes occupied, offices worked in, chairs sat on, laptops operated, advertisements viewed, websites perused, transactions serviced, transport taken, streets traversed, and cities resided in. People’s interactions with all of these things (goods, services, clothing, buildings, machines, etc.) are all designed.

Design is a crucially important part of everyday life that is both visible and frequently invisible. For design to exist, people in developed and developing countries alike use a vast amount of the planet’s finite resources. Production and consumption involved with design release huge quantities of emissions into the atmosphere everyday. Consumers of design are not necessarily aware of the omnipresence of design, nor do they always consider the environmental, social, cultural, political or economic costs associated with their purchasing decisions.

In 1968, a global non-governmental think tank commissioned a project team from Massachusetts Institute of Technology (MIT) to write a report about the state of the world. Four years later The Limits to growth: A report for the Club of Rome’s project on the predicament of mankind was released (Meadows, Meadows, Randers, & Behrens III, 1972). The team used “system dynamics theory and computer modelling to analyse the long-term causes and consequences of growth in the world’s population and material economy” (Meadows, Randers, & Meadows, 2005, p. ix). The report highlighted how current levels of resource use and emissions would significantly and negatively influence global developments in the twenty-first century if current rates of use continue (ibid.). The study was by no means an accurate prediction as to the fate of the world, but it did provide some accurate calculations such as the increase in population from 2.1 billion to six billion people by 2000, and the percentage increase needed in global food production (ibid.). The report recommended that individual self-restraint and governmental enforcement, in combination with technological improvements, could achieve a change from unsustainable levels of production and consumption towards more sustainable quantities (Eastin, Grundmann, & Prakash, 2011).

Relating this back to design, by the 1980s there were twenty-six different definitions of design, each distinguishable from the next because what constitutes ‘design’ for the
practicing designer is different from the design educationalist and the researching academic (Bernstein, 1988). In the 1990s, Tony Fry asserted that “[d]esign shapes much of the world we shape and that shapes us” (1992, p. 41). His claim connects the role of designers with the continuous growth of production, consumption and waste. At the turn of the century, John Heskett maintained that design is “the human capacity to shape and make our environment in ways without precedent in nature that serves our needs and gives meaning to our lives” (2002, p. 10). Thus, design conspicuously, but also inconspicuously, influences the way in which people behave, and how they interact with a world that is constantly growing and changing as they find their own innovative ways of interfacing with newer objects, services, graphics, games, fashion, architecture, the Web, and all the other forms of design. In effect, *Design means different things to different people* (Micklethwaite, 2003). Moreover, design is continuously evolving as people learn more about better ways to use and interact with a wider variety of interfaces and methods of communication. Clearly, contemporary design is a dynamic and flexible activity that cannot be distilled and defined in a single sentence (Buchanan, 1992). Thus, design continues to defy clear definition.

The present research is grounded in the relationships between design, consumerism, unsustainability and sustainable education. In particular, the study investigates the connections between design and sustainability. The latter is as complex as design, and is therefore equally hard to define. Through a qualitative and pragmatic grounded theory approach, I aim to reflect on how designers are some of the most active contributors to social, environmental, and economic change. The planet is in a predicament, partly because of the effects of ‘design’ and, as a result, design and designers need to work towards becoming an antidote.

This first chapter addresses the question: Why this research and why now? I explain how significant social, cultural, political, economic, and environmental changes are currently underway globally and nationally. However, understanding and implementing sustainable solutions is not a simple and straightforward task, and it is clear that design has had a close association with the social development of consumerism and unsustainability. The following section explains the relationship between the first three chapters of the thesis, in particular Chapters one and two.

**Outlining the Structure of Chapters One and Two**

The theoretical position from which this transdisciplinary research is undertaken is predominantly the disciplines of design and higher education. These inform the different research areas, which have created this introductory chapter (one), the literature review chapter (two) and the methods and methodology chapter (three). Before identifying the research problems or questions, specific fields of research are explored and diagrammatically shown in Figure 1.1.
Figure 1.1. Development of the research problem and subsequent research questions

The diagram shows each section of the first two chapters as layers that funnel down towards the emergence of the research problem and subsequent research questions that are also influenced by my personal context and theoretical assumptions (identified and discussed in Chapter three). The order of the layers indicates how each topic informs the next. The top two layers frame the problem for the remainder of the research, which incorporates a national overview of positive sustainability achievements leading into accompanying problems that can create complexity in designing scenarios for a more sustainable future (Chapter one).

The following chapter (Chapter two) focuses on research associated with the bottom four layers of the diagram; these include unpacking the complexities of societal conceptions of design and the theory, teaching and practice of design, also sustainable design, sustainable education, and sustainable design education. There are many ways to combine the words design and education with sustainability, each combination can be argued as stronger or weaker than another. I prefer to use the terms identified in Figure 1.1 because, as Sterling and Thomas argue, genuine understandings of sustainability need to be wholly integrated throughout all types of design and education as opposed to designing or educating about or for sustainability (S. Sterling & Thomas, 2006). The depth of each layer symbolises its significance to the research problem; for example, predominant arguments are formed in the two deepest layers, thus indicating the significance of the depth of knowledge necessary to understand design and sustainable design. As I progress through these topics, the research
problem and questions develop; for ease of reference they are introduced at the end of the first chapter, which frames the problem for the remainder of the thesis.

Sustainability in Aotearoa/New Zealand

The focus of this research study is the approach to the inclusion of sustainability in the teaching and practice of design in the island nation of Aotearoa. Prior to clarifying the research problem, I will review relevant investigations into sustainability action, past and present, in this country, and in this way, introducing the concept of sustainability. The following chapter (Chapter two) reviews a broader scope of international literature, in the fields of research indicated in Figure 1.1, above. The current section, however, provides a background for studying sustainability in this country, which has a national identity that is labelled as ‘clean and green’ and ‘100% Pure’ (Bebbington, Higgins, & Frame, 2009; Brown & Stone, 2007; Morgan, Pritchard, & Piggott, 2002).

A particular focus for this section is the current understanding of and action towards sustainability from different sectors, encompassing government, community, education and business. In contrast with many other developed countries, New Zealand has a rich ecological heritage and is relatively unspoiled (Brown & Stone, 2007). A feature of especial significance is the broader interface between ecology and society, specifically with tāngata whenua (the indigenous people of the land – Māori), which has subsequently led to mandatory levels of community consultation (ibid.). For instance:

In addition to the regulatory requirements that it places on business development, the RMA [Resource Management Act] also draws attention to two key features that differentiate New Zealand’s sustainable business context from that of other countries. The first is the significance that is assigned to the indigenous Māori people of New Zealand, and the second is the fundamental principle of public participation in decision-making (ibid., p. 717).

New Zealand was the last major land mass discovered on earth; it has distinct landscapes, flora and fauna, but it is unique in the respect and rights given to the indigenous people of the land (ibid.). The country has a relatively small population (4.37 million people), a low density (in 2010 it was 16.3km² per person) (OECD, 2011, p. 7) and, in combination with the absence of large-scale heavy industry, promotes its national identity as “clean and green” (Bebbington, Higgins, & Frame, 2009; Brown & Stone, 2007).

In 1999, Tourism New Zealand launched “100% Pure” as a travel destination brand to showcase the country’s diverse landscape, culture, people and outdoor activities (Morgan, Pritchard, & Piggott, 2002). Both taglines (Clean and Green, and 100% Pure) are used to promote tourism and exports nationally and internationally (Frame & Newton, 2007). Bob Frame and Bronwyn Newton report:

New Zealand has one of the highest rates of renewable energy supply among developed countries, mostly hydro and geothermal; this is 30% of consumer energy
(compared with 6% for Australia and the US). The country’s oceanic location produces weather conditions which would allow for different sources of renewable energy production (including wind turbines) (ibid., p. 574) [brackets in original].

Due to mounting concern as to the effect of excessive use of resources, population sprawl, development of urban areas and demand for energy, agriculture, and transport on Aotearoa’s natural environment, the Resource Management Act (RMA) was implemented in 1991 (Freeman & Thompson-Fawcett, 2003). The following year, Agenda 21, a strategy aimed at halting and reversing the effects of environmental degradation, was adopted globally at the United Nations Conference on Environment and Development (M. J. Williams, 2003).

In brief, due to its population density, location, culture and diverse people, the nation has the potential to instigate a breadth of sustainable initiatives (Frame & Newton, 2007; Freeman & Thompson-Fawcett, 2003; Parliamentary Commissioner for the Environment, 2002). The following discussion indicates how government initiatives, active citizens, educational models and business networks are taking advantage of the country’s potential to change existing unsustainable models. However, as the discussion progresses the difficulties associated with implementing sustainability are highlighted, culminating in a section that explores the complexity of designing scenarios for a more sustainable future.

Throughout the following discussion, the terms sustainability, sustainable development and sustainable education are intermittently used; their usage depends upon the context of the discourse. For instance, in the following subsections sustainable development is commonly used within governance and business, in the community sector the term sustainability is favoured, and within education, sustainable education or education for sustainability are prevalent. I will not belabour the distinctions in this introductory chapter, but will instead highlight the notion that it is significant that these sectors of New Zealand society are incorporating the word sustainability or sustainable into their fields of work. The semantics of these terms are further explored in Chapters two, three and four.

**An Outline of Current Government-based Sustainability**

The country’s mode of public participation has developed through a democratic nation and consultation with tāngata whenua. Such consultation requires effective systems and shared decision making from communities at both a local and central government level (Thompson-Fawcett & Freeman, 2006). This subsection provides an overview of governmental decisions, reports, policies and actions that affect sustainability in education in this democratic island nation.

At times, central government has supported the notion of ‘sustainable development’. Sustainable development is commonly attributed to the *Brundtland Report* (World Commission on Environment and Development, 1987), yet awareness increased significantly
after the 1992 *Earth Summit in Rio de Janeiro* (Fien & Tilbury, 2002), where 179 countries signed the historical document: *Agenda 21*; committing themselves to promoting sustainability (United Nations, 1992). In 2002, a paper aimed at reviewing New Zealand’s sustainability achievements ten years after signing up to Agenda 21 was published by the Parliamentary Commissioner for the Environment (PCE): *Creating Our Future: Sustainable Development for New Zealand*. The intention behind this review was to investigate how best to focus the nation towards creating a sustainable future (Parliamentary Commissioner for the Environment, 2002). The executive summary of the publication, reports:

New Zealand has most of the ingredients to evolve its social, economic and environmental policies to deliver the qualities of life we aspire to and would wish for our children’s children: innovative people; a robust democracy; a developed economy; abundant environmental resources; a love of ‘team play’; a growing sense of who we are; a low population density (ibid., p. 5).

Despite these assets, Morgan Williams, who was the Parliamentary Commissioner for the Environment at time of publication, revealed that the country was “still struggling to think, design and turn sustainable development into a reality at national level” (M. J. Williams, 2003, p. 3). A further governmental strategy was released in 2004 called *See Change: Learning and Education for Sustainability* (Parliamentary Commissioner for the Environment, 2004). More recently, the current Parliamentary Commissioner for the Environment, Jan Wright, reports:

The case for an Environment Reporting Act is clear. New Zealand is the only country in the OECD [Organisation for Economic Co-operation and Development] without an ongoing statutory commitment to regularly reporting on the state of its environment. Yet we brand ourselves as ‘clean and green’ (Parliamentary Commissioner for the Environment, 2010, p. 6).

In their study of sustainable settlements in New Zealand, Claire Freeman and Michelle Thompson-Fawcett recognise similar strengths to the Parliamentary Commissioner, indicating the potential for sustainably developed urban areas, although just like the Commissioner they also conclude “current practice is so inadequate that the shift to sustainability will be a long time in coming” (Freeman & Thompson-Fawcett, 2003, p. 225). Hence, although some sectors of government are moving towards a sea change, other sectors are not. In order to turn sustainable development into reality, Williams calls for society’s support and leadership from citizens, including individuals, businesses and community groups, who can encourage local and central governments “to provide the essential and empowering contributory process” (M. J. Williams, 2003, p. 4). Therefore, the following subsection concerns action at community level.

**An Outline of Current Community-based Sustainability**

Despite its small size and low population, many like-minded citizens of New Zealand are becoming involved in socially, environmentally and financially sustainable initiatives. In
this subsection, I provide an outline of sustainability initiatives found at the grass-roots level that differ in approach from those identified above.

One example is the ReGeneration project, an idea born out of the Enviroschools movement (see www.enviroschools.org.nz and www.regeneration.org.nz) (J. Roberts & Bolstad, 2010). Enviroschools is a concept that emerged from Hamilton City Council in 1993 due to increasing concern for the state of the global ecosystem (Bolstad, 2005; S. Jackson, 2009). Three schools successfully implemented environmental action into the curriculum by 1999. By 2001, a kit and handbook had been launched, alongside a professional development programme to train Enviroschool facilitators, which was available to schools interested in becoming an Enviroschool (S. Jackson, 2009). The ReGeneration project builds on this foundation and has a long-term ambition to “develop nodes of youth-initiated and youth-supported regenerative action in communities across all regions of New Zealand” (J. Roberts & Bolstad, 2010, p. 3). On the ReGeneration website, the project is described as:

...an independent network for young New Zealanders who are working to create positive change in their communities, workplaces, families, schools and natural environments. Members support each others’ work through regular projects and collaborations, annual events and online networks (Evans & Matheson, 2011a).

A team of ten people spent fifteen weeks (between March and July 2011) travelling to each region of the country to visit schools, convene community forums, host weekend youth retreats and participate in community action projects (Evans & Matheson, 2011b). The team recorded short films capturing stories of some of the projects and people they met along the way. The team showcased their work in an exhibition held in Wellington from the 8th – 11th July 2011. The sole purpose of the road trip, the workshops and action was to obtain and promote examples of active citizenship, generosity, volunteering, social enterprise and innovation (Matheson, 2010; J. Roberts & Bolstad, 2010). The project grew from initially concentrating on young people to incorporating a wide variety of change-makers.

Action towards creating a more sustainable society at a grassroots level is underway. Some communities of people have a relatively broad understanding of what sustainability can mean, which has lifted the level of awareness and implementation. The following subsection focuses on action at an educational level.

An Outline of Current Education-based Sustainability

The films collected during the ReGeneration road trip tell the story of passionate, motivated individuals and groups of people around the nation who are actively involved in creating positive social and environmental change. However, learning for a more sustainable future is arguably more challenging, hence engagement is sought through communities and case studies (Tilbury & Wortman, 2004). Therefore, in this subsection I provide an overview of current recommendations from leading researchers regarding
sustainable education, which introduce global recommendations leading into national actions (this topic is further explored and critiqued in Chapter two).

Global interest in sustainable education emerged around the same time countries were signing Agenda 21 in 1992, as promoting sustainable development through a variety of means, including education was encouraged (Fien & Tilbury, 2002). Currently, initiatives such as The United Nations Decade of Education for Sustainable Development (2005-2014) are in place. The United Nations Education, Scientific and Cultural Organisation (UNESCO) assert:

...the DESD [Decade of Education for Sustainable Development] aims to integrate values, activities and principles that are inherently linked to sustainable development into all forms of education and learning and help usher in a change in attitudes, behaviours and values to ensure a more sustainable future in social, environmental and economic terms (UNESCO, 2007, p. 5).

This aim has the potential for far-reaching implications that touch on every aspect of life (Tilbury & Wortman, 2004; UNESCO, 2007). There are four key objectives for the Decade, which are to:

- facilitate networking, linkages, exchange and interaction among stakeholders in ESD [Education for Sustainable Development];
- foster an increased quality of teaching and learning in education for sustainable development;
- help countries make progress towards and attain the Millennium Development Goals [these range from halving extreme poverty – hunger, child and maternal mortality – to halting the spread of HIV/AIDS, upgrading slums, and providing safe water and universal primary education, all by the target date of 2015, see www.un.org/millenniumgoals for more information] through ESD efforts;
- provide countries with new opportunities to incorporate ESD into education reform efforts (UNESCO, 2007, p. 6) [bullet points in original].

The need for sustainability to be incorporated into higher education is becoming widely accepted and it is increasingly being introduced, although agreement on meanings is contested (I. Thomas, 2009). Moreover, there is a distinct difference between the inclusion of sustainability in higher education and actually integrating it into higher education. Stephen Sterling and Ian Thomas illustrate four different approaches in Figure 1.2.

Figure 1.2. Stages for the development of sustainable education in universities (S. Sterling & Thomas, 2006, p. 355)
Here, the premise is that in order for sustainability to be wholly integrated into education, a rebuild or a redesign of the curriculum is necessary. In New Zealand, education for sustainability was successfully introduced into some primary and secondary school curricula through the Enviroschools programmes (Bolstad, 2005). Research in the Asia-Pacific region suggests many creative initiatives and considerable progress is being made in education for sustainable development, although “further work is needed to promote systemic change in educational arenas, particularly in terms of strategic integration within HE [Higher Education] institutions” (Ryan, Tilbury, Corcoran, Abe, & Nomura, 2010, p. 106).

In 2004, sustainability in tertiary education was still on the fringes of understanding and inclusion (Parliamentary Commissioner for the Environment, 2004). Three years later, in a review of the ‘See Change’ strategy, the Parliamentary Commissioner reported:

The Tertiary Education Strategy and Statement of Tertiary Education Priorities have been reviewed, and now take into account more opportunity for EFS [Education for Sustainability]. Further opportunities remain for progress within the tertiary sector” (Parliamentary Commissioner for the Environment, 2007, p. 5).

In her 2008 PhD thesis, Pam Williams reports that despite the “individual ‘lone-rangers’ who operate as ‘distributed’ and sometimes isolated sustainability leaders,” she mainly found insignificant numbers of national university programmes with a sustainability focus (p. 250). Williams’ study indicates that some individuals are integrating sustainability into their courses in this country, but often on their own and without “hierarchical leaders” (ibid.). However, at the Otago Polytechnic in Dunedin, the leadership team has made the decision to adopt sustainability as one of its key organisational values for the institution (Birnie, Ellwood, Henry, Mann, & Pawlowski, 2008). Moreover, research is underway into what it means to educate every student as a sustainable practitioner (Mann, 2011). Nevertheless, there is a lack of research into whether a whole curriculum rebuild or redesign is necessary to integrate (as opposed to include) sustainability into higher education.

An Outline of Current Business-based Sustainability

Throughout the course of this thesis I will build an argument regarding the importance of integrating sustainability into education. A key goal for tertiary education is to create employable graduates (Bridgstock, 2009), and it can be expected that some of these graduates will become influential in the business sector. This subsection concerns the role of social and environmental responsibility currently found within corporations and small to medium businesses in New Zealand.

Two prominent groups of practice-based and academic-based individuals that debate social and environmental issues within the business sector are The Sustainable Business Network (SBN) and The New Zealand Business Council for Sustainable Development (NZBCSD) (Allen, 2009). However, at the end of November 2011 members of the Business
Council for Sustainable Development voted overwhelmingly to merge with BusinessNZ and create the Sustainable Business Council (SBC), commencing on the first day of 2012 (see www.nzbcasd.org.nz). Due to full details of their approach and understandings of sustainability not yet being available, I will introduce the Business Network and the original Business Council and explain differences in the roots of their understanding of sustainability and subsequent influence for the business sector.

Dick Hubbard is the magnate behind Hubbard’s Foods Limited, a cereal manufacturer in Mangere, Auckland, and is well known for his stance on social responsibility (Kirkwood & Ruwhiu, 2003). Kerry Griffiths is a Senior Sustainability Consultant for the company ‘URS New Zealand’ and has a Masters in Responsibility in Business Practice. Dr Rodger Spiller has a PhD in ethical and sustainable business and investment (Allen, 2009). Together the group established The New Zealand Businesses for Social Responsibility in 1998 and one of the group’s key messages became based on Spiller’s (2000) Four P’s of ethical business. The model includes, [1] Purpose (creating environmental, social and financial wealth), [2] Principles (honesty, courage, caring and fairness), [3] Practices (community, environment, shareholders, suppliers, customers and employees), and [4] Performance measurement (quantitative, qualitative, company data and shareholder perceptions) (2000, p. 151). The model was developed during Spiller’s PhD thesis, and epitomised the message to businesses of “doing well by doing good” (Allen, 2009, p. 28). However, the group failed to attract sufficient numbers and joined forces with another Auckland based group to become the Sustainable Business Network (see www.sustainable.org.nz) in 2002.

The Sustainable Business Network provides members with tools and seminars on sustainable business practices (Collins, Lawrence, Pavlovich, & Ryan, 2007). The creation of the network was driven by a more environmental focus, as opposed to the social concerns of the original New Zealand Businesses for Social Responsibility (Allen, 2009). The intention of the network is to create new systems, tools and smarter solutions, to share knowledge, to learn from latest research and industry leaders, to reward leadership and to encourage practical activities that strengthen members’ brands (Collins et al., 2007).

Upon the merging of the two groups, some leading entrepreneurs joined the Business Network; others chose a different path. Stephen Tindall is the Chief Executive Officer of the country’s largest privately owned retail chain: The Warehouse (Higgins & Walker, 2010). He is perhaps one of the country’s most prominent businessmen, and a firm supporter of and contributor to much public debate to the original New Zealand Businesses for Social Responsibility. Tindall has gone on to became a significant founding member of the Business Council for Sustainable Development (Allen, 2009). The group was formed in 1999 and currently has forty-seven invited members (see www.nzbcasd.org.nz) that range from very small consultancies to some of the country’s largest manufacturers, retailers and service
organisations (Milne, Tregidga, & Walton, 2004). Similar to the Network, the Council is a coalition of leading businesses dedicated to act as a catalyst for change in the country (Allen, 2009; Milne et al., 2004).

Internationally, other business groups have formed for the same purpose. The Natural Step was founded in Sweden in 1989 and is committed to researching sustainability in order to link it to real world applications; the concept has since spread around the world. In New Zealand, the Natural Step:

…provides education, training, coaching and advice to existing and emerging leaders to help them integrate economic, environmental and social priorities into their decision making and planning. We promote sustainability: living within the planet’s ability to support us today and tomorrow (Henry & Roberts, 2009, p. iii).

In brief, significant academic and practice-based leaders in the business sector are involved with understanding and implementing economic, social and environmental sustainability. However, underlying understandings of sustainability can vary significantly.

A number of different illustrations can be used to represent or encapsulate sustainability (Mann & McGregor, 2011; Stanners et al., 2007). Two distinct models are common in New Zealand; the first is based on overlapping circles (Figure 1.3), which is used by the Business Council for Sustainable Development (Figure 1.4) and the second, concentric circles (Figure 1.5).

Figure 1.3. Overlapping circles - Model of sustainability, also known as a Venn diagram

The Venn diagram illustrates how economics, the environment, and society form equal and overlapping circles intersecting in the centre, thus identifying the role of sustainability. This type of model is often associated with the origins of ‘sustainable development’, described as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987, p. 1). However, this type of diagrammatical representation has received criticism because it emphasises that the economy, environment and society are identical and that they intersect with each other, but
offers no way of characterising the linkages or trade-offs between each (Mann & McGregor, 2011; Stanners et al., 2007; Strachan, 2009; Sustainable Aotearoa New Zealand, 2009). Moreover, it highlights a sweet spot in the middle that is the target for sustainability, yet it is a small and hard to find location (Mann & McGregor, 2011). Overall the model “puts no emphasis on looking for solutions in fundamental changes to whole systems” (Stanners et al., 2007, p. 154). The Business Council commonly use the overlapping circle model to represent their sustainable vision (Figure 1.4).

Figure 1.4. The Business Council’s current sustainability model (Source: NZBCSD website)

An alternative to this model is the concentric circles model of sustainability (Figure 1.5). Sustainable Aotearoa New Zealand reports that the nested model is strong, as opposed to the weaker representation of the Venn diagram (2009). Similarly, other studies support this difference, indicating “[t]he socioeconomic system is distinct but embedded in and dependent on the environment. From this flows integration and clearer trade-offs because the need for them to sustain the whole is apparent” (Stanners et al., 2007, p. 154).

Figure 1.5. Concentric circles - Model of sustainability, also known as nested or egg model

Sustainable Aotearoa New Zealand recently launched the Phase2 strategy (see www.phase2.org) dedicated to the advancement and adoption of science, and ethics-based
sustainability through leadership and engagement. Their most recent publication, *Strong Sustainability for New Zealand: principles and scenarios*, criticises the orientation and scope of this country’s sustainability law and policy, reporting they fall into the “weak sustainability” category, “[w]hen it comes to strong sustainability, ‘doing less bad’ or ‘doing some good’ are not sufficient” (Sustainable Aotearoa New Zealand, 2009, p. 10). Their report also reviews the Triple Bottom Line model of reporting, stating it:

...has a further insidious influence. Many members of the public, businesses, governments, and NGOs – people who want genuinely to reduce or prevent outcomes such as environmental degradation or human inequality – accept the model as true. They believe their actions are contributing to eventual global sustainability. Many of these initiatives indeed improve the environment and alleviate poverty, but at best their efforts are making the world less unsustainable (ibid., p. 10).

In a similarly harsh analysis, Wayne Norman and Chris MacDonald assert a conceptual and practically based argument “(a) that what is sound about the idea of a Triple Bottom Line is not novel, and (b) that what is novel about the idea is not sound” (2004, p. 243). Linking back to the government sector, a recent report from the Ministry for the Environment asserts “[o]ur current move to eco-efficiency practices is an important first step towards achieving a short term sustainable built environment, but is not sustainable in the long term” (Ministry for the Environment, 2009, p. v). An example of this is arguably the Resource Management Act, which can be criticised for its limitations and for specifically promoting a focus on the environment and failing to create a holistic understanding of the word sustainability (Freeman, 2007; Parliamentary Commissioner for the Environment, 2002).

Some New Zealanders from government, community, education, and business sectors are actively engaging with social and environmental issues through a variety of designed-to-enhance sustainability initiatives. Identifying current national and local sustainable practices and initiatives help frame the research problem. Moreover, as I explain in chapter three, I commenced this research believing Aotearoa was behind other developed countries in terms of sustainable design and education, yet throughout the course of the study I have gained a deeper insight into the sustainable strategies and actions of New Zealanders specially educational and business perspectives.

Despite these examples of sustainable plans and action there are many other practices that can be questioned on the grounds of increasingly unsustainable levels of production, consumption and waste. Some of these unsustainable practices are explored in the following section.
The Complexity of Designing Scenarios for a More Sustainable Future

Visualising what a sustainable future looks like is complex (B. Sterling, 2005; I. Thomas, 2009). Therefore, designing scenarios for a more sustainable future is no simple task, nor is it within the capacity of just one study. This thesis, however, contributes processes and approaches that can build capacity and capability towards that goal. Charles Hopkins and Rosalyn McKeown suggest that “[i]t is curious to note that while we have difficulty envisioning a sustainable world, we have no difficulty detailing what is unsustainable in our societies” (2002, p. 13). A lack of understanding and action promote unsustainable levels of production (Calvelli, 2009; Campbell & Roberts, 2010; Fry, 2000; LeCain, 2009; Newman, 2009; B. Sterling, 2005) and also unsustainable levels of consumption (T. Jackson, 2005; Kang & Wimmer, 2008; Marchand & Walker, 2008; Mont & Plepys, 2008).

Research shows that a wide variety of unsustainable elements can be related back to design decisions, thus indicating designers have an active role in sustainable production and consumption (Chapman, 2009; Kang & Wimmer, 2008; B. Sterling, 2005; Thorpe, 2010; Wahl & Baxter, 2008). Designers and engineers are key decision-makers in the life of products, especially in terms of material choices. For example, the detailed design stage (also called the design and development phase) of products, including electronic devices, specifies seventy-five percent of resources used (Argument, Lettice, & Bhamra, 1998). Eighty percent of both economic costs and environmental and social impacts are influenced at this stage (Charter & Tischner, 2001; Dewberry & Sherwin, 2002; Tischner, 2001; White, Pierre, & Belletire, 2005). This section therefore justifies why this research is important through exploring what is unsustainable in Western societies, and how these concepts relate to the teaching and practice of design.

My research builds on Hopkins’ and McKeown’s insight, illustrating the complexity caused by some deep-rooted problems of unsustainability. It is not within the scope of this thesis to prove or disprove the material conditions or single-issue symptoms associated with unsustainability, such as whether climate change is human-made, whether overpopulation will cause food and water crises, or whether the extraction of oil has already peaked. Rather, this thesis addresses the bigger picture of how human beings can collaborate on designing scenarios for a more sustainable future.

Unsustainable Patterns of Production

Widespread pollution accelerated rapidly in the eighteenth century with the development of the Industrial Revolution (the steam engine, for example, was invented in the 1750s). A mechanised means of manufacture allowed for a much greater volume of production, generating a corresponding increase in a wide variety of pollution to air, rivers, oceans, soils, and beaches (Carson, 1962; Heinberg, 2007; Krech, 2004; Marshall, 2005; Mau,
Industrialisation has also driven global depletion of exhaustible resources, from coal, oil and gas, to minerals and ores such as gold, copper and uranium (Heinberg, 2007; Solow, 1974).

People interact with designed objects and services everyday. As one example, a common electronic device in use today is the laptop computer, which requires a wide variety of resources: plastics, ceramics, halogens (bromine, fluorine and chlorine), glass, fluids and metals (such as iron, copper, aluminium, nickel, zinc, tin, cobalt and gold). Then there are the hazardous substances that are also required: mercury, beryllium, lead, cadmium, arsenic (Hagelüken & Corti, 2010; Rammaniya, 2010; Robinson, 2009) and the flame retardants, polybrominated diphenyl ethers (PBDEs) and polychlorinated biphenyls (PCBs), which are both found in transformers, capacitors, and coolants (Robinson, 2009). Some 300 tonnes of gold alone is used in the manufacture of electronics each year (Hagelüken & Corti, 2010). This collection of materials in a product does not include the full extent of the resources used to create it. In fact, the amount of waste materials generated in the production of a laptop computer is close to 4,000 times the product’s weight (Hawken, Lovins, & Lovins, 2010).

Many of the resources indicated above are high-grade minerals that can be obtained only through major mining operations and energy intensive and polluting transformation processes. Copper is the third most important metal used by humans (Radetzki, 2009), yet turning the mineral into the hundreds of kilometres of wiring for power lines and the different parts required for electronic devices requires numerous processes.

Once a mineral is mined, it must be separated from the raw ore. This process is particularly energy intensive and polluting for aluminium. Aluminium is found in bauxite ore and, like copper, is open-pit mined (Menzie et al., 2010); however, aluminium is the most energy intensive of all metals to process (Cooksey, Taylor, & Chen, 2008; Dyroy, Tveten, Karlsen, & Scotland, 2008; Green, 2007; Menzie et al., 2010). This is because, despite the fact it is the third most abundant element in the earth’s crust, accounting for approximately eight percent (compared to 0.01 percent copper) (LeCain, 2009), aluminium exists in very stable combinations with other materials, meaning complex processes are required to separate it (Cooksey et al., 2008). Therefore, the ways in which we make some everyday objects can cause considerable resource depletion and industrial pollution. The following subsection considers how consumption can be designed.

Unsustainable Patterns of Consumption

Post-war depression provided an economical reason why, in some countries, citizens were encouraged to consume. In 1929, domestic theorist Christine Frederick wrote *Selling Mrs. Consumer*, in which she asserted “we have learned that the way to break the vicious deadlock of a low standard of living is to spend freely, and even waste creatively” (Frederick, 1929, p. 81). She continued:
The difference between real waste and creative waste is not at all difficult to define. Businessmen are long familiar with it. They will cheerfully sell or throw out an office or factory machine, bought only last year and which is still good for years of use, in favor of a new model bringing additional economy or convenience or smartness. It is in fact recognized as stodgy and backward not to do so. It is genuine creative waste; it has been the great developer of business and industry. Why not recognize the same principle in the home? (ibid.).

Frederick’s proclamations were developed and reiterated a few years later by an advertising executive, Ernest Elmo Calkins. He first used the term ‘consumer engineering’ at an advertiser’s convention in Washington. He explained:

The newest business tool to receive a definite name is what has come to be known as consumer engineering. Briefly it is shaping a product to fit more exactly consumers’ needs or tastes, but in its widest sense it includes any plan which stimulates the consumption of goods (Calkins, 1932).

Roy Sheldon and Egmont Arens further developed the concept, with Calkins’ permission and advice, into a book by the same name (Sheldon & Arens, 1932). In it they reasoned:

Goods fall into two classes, those we use, such as motor cars or safety razors, and those we use up, such as toothpaste or soda biscuit. Consumer engineering must see to it that we use up the kind of goods we now merely use (ibid., p. 18) [emphasis in original].

Similarly, a pamphlet titled Ending the Depression Through Planned Obsolescence (London, 1932) was published in New York in the same year. In the pamphlet, Bernard London blamed the global economic depression on consumers who disobeyed “the law of obsolescence” by:

...using their old cars, their old tires [sic], their old radios and their old clothing much longer than statisticians had expected on the basis of earlier experience. The question before the American people is whether they want to risk their future on such continued planless, haphazard, fickle attitudes of owners of ships and shoes and sealing wax (London, 1932, p. 2).

However, the first use of the term Planned Obsolescence is generally attributed to the title of Brooks Stevens’ speech to a local advertising club in Minneapolis some twenty-two years later (Adamson, 2003). In 1954, Stevens defined the concept of planned obsolescence as “instilling in the buyer the desire to own something a little newer, a little better, a little sooner than is necessary” (Adamson, 2003, p. 129).

One of Stevens’ critics, Vance Packard, identified two types of planned obsolescence: “functional” and “psychological.” Functional obsolescence is built into an object so it simply wears out more quickly. Psychological obsolescence is based on consumer perception; ensuring objects are swiftly perceived as outdated and old (Packard, 1960, pp. 54, 68). The following two subsections explain each in more detail.
Functional (or built-in) obsolescence.

Over the last century designers had a vital role in shaping consumption. In 1946 an exhibition entitled *Britain Can Make It* encouraged designers to use the “best possible materials and the quickest possible production processes” to create “good design” (Dewberry, 1996, p. 20). This post-war affluence and design thinking led the way to the consumer society of the 1950s where “consumers across the globe sought to represent their personal aspirations through their domestic interiors” (Sparke, 1998, p. 136).

Built-in or functional obsolescence is the term attributed to the planned and purposely designed malfunctioning of a product to stimulate higher consumption levels. This artificial malfunction is an “obsolescence of quality” whereby “a product breaks down or wears out at a given time, usually not too distant” (Packard, 1960, p. 58). The average lifespan of a product today is far shorter than it was twenty years ago (Kang & Wimmer, 2008).

Despite a distinct lack of empirical research from businesses on designers’ role in functional obsolescence, it can be common practice (Cooper, 2004). Tim Cooper notes that the Organisation for Economic Co-operation and Development (OECD) “reported claims that life-lengthening innovations were suppressed (notably one regarding fluorescent light bulbs)” (Cooper, 2004, p. 424) [brackets in original]. This shortening of longevity is driven by “a need for cost reductions in order to meet price points, [and] the convenience of disposability” (Chapman, 2009, p. 31). Hence the continually expanding spiral of production and consumption is sustained. Cooper’s own considerable research into consumers’ attitude to product obsolescence also indicates that “psychological, technological, and economic factors exert as much influence on life spans as technical reliability” (2004, p. 441). Thus leading to the concept of perceived obsolescence, which is explored in the next subsection.

Perceived (or psychological) obsolescence.

Controlling the duration of a product’s technical lifespan is not the only method of encouraging consumption. There is a more complex system in play: planned obsolescence of the psychological kind. This perceived obsolescence can be described as consumers replacing working products with others that are largely comparable but simply have more attractive features (Pizzocaro, 1992). Packard describes it as the “obsolescence of desirability” in which “a product that is still sound in terms of quality or performance becomes ‘worn out’ in our minds because a styling or other change makes it seem less desirable” (Packard, 1960, p. 59).

Many products have become identity symbols. The continuous replacement of products perceived as obsolete enables the consumer to keep up with fashion (Chapman, 2009; Kang & Wimmer, 2008). It leads to a “strongly rooted belief that I am what I buy and
own” (Ullrich, 2006, cited in Kang & Wimmer, 2008, p. 1147) [emphasis in Kang & Wimmer, original source in German]. Figure 1.6 shows a few examples of product logos that can be viewed as a type of identity symbol for a wide variety of people around the world.

![Figure 1.6. Seven product logos, from top left to bottom right: Nike, Ferrari, Blackberry, Hello Kitty, Volkswagen, Apple and Vodafone](image)

Some products become so famous they do not need names on their logos; they are instantly recognisable. Figure 1.6 shows logos from some of these famous brands: Nike, Ferrari, Blackberry, Hello Kitty, Volkswagen, Apple and Vodafone. Just as the Apple iPhone revolutionised how people interact with smartphones (Sande & Sadun, 2010; Verkasalo, Lópex-Nicolás, Molina-Castillo, & Bouwman, 2010); the Apple iPod revolutionised how people listen to music (Vogel, Cagan, & Boatwright, 2005). As a result it became an iconic identity symbol, to the extent that it can be recognised solely by the distinct white cord running from ear piece to music player (Jenkins, 2008). A similar effect has been observed in terms of the vast quantities of paraphernalia adorned with Hello Kitty that is so popular with Japanese high school girls (T. Suzuki & Best, 2003). So, some “[p]eople define themselves and others in terms of the things they possess” (Kang & Wimmer, 2008, p. 1147).

These types of products are significant in terms of social meaning or perceived benefits. For instance, some products have a “non-monetary ‘design value’” connected to social practices that prioritise style over function (Micklethwaite, 2003, p. 5). The usability of these objects becomes less important than the luxuriousness that is associated with them (Kang & Wimmer, 2008). In Chapter two I further explore the concept that products can shape, serve and give meaning to people’s lives, where, in some cases, the function of the object is irrelevant. However, in this subsection, importance lies with a type of ‘retail therapy’ (Kang & Wimmer, 2008, p. 1147), where consumers are continuously keeping up-to-date with the latest fashions, trends, products and/or technology, specifically due to a form of social status, and which, in turn, leads to the increasing perception that products are outdated despite still being functional. One reason this perception of obsolescence has emerged is through advertising agencies, and can be attributed to injecting emotions into advertising campaigns that aim to prompt “fear in women of being frumps [and], fear in men of being duds” (O’Dea, 1937, p. 93). Designer objects are often associated with rapid technological updates that render devices and gizmos wrongly defunct. This conception further fuels a

Establishing the drivers underlying the throwaway culture is imperative if we are to understand the generation of unnecessary waste and over-consumption. Empirical research into the causes of the throwaway society was scarce until the turn of the twenty-first century and was primarily based on anecdotal information (Cooper, 2004). As Frank Ackerman maintains, rapid increases in income have been a basic precondition for the development of throwaway societies:

Throughout the late nineteenth and early twentieth centuries, incomes rose rapidly in the countries that are now described as ‘developed’. In particular, incomes rose faster than material prices, so that it became possible for the average person to buy more goods. Indeed, this change is fundamental to the meaning of economic development: people become less the slaves, and more the masters, of their material environment. As a consequence, people consume more and discard more (Ackerman, 2005, p. 501).

For many wealthy people, shopping in and of itself has become a psychologically effective activity (Kang & Wimmer, 2008). The normalisation of shopping for the sake of shopping suggests a culture of over-consumption. Cooper’s (2004) research reveals links between over-consumption and the unnecessary generation of waste. Cooper found that “[d]iscarded appliances that were described as broken beyond repair were in a minority; most were thrown away because they were no longer wanted or needed some repair work” (Cooper, 2004, p. 440). His research shows British society now so loves convenience that it would rather replace than repair. Other developed societies have similarly succumbed to the “unconditional acceleration of sales” (Pizzocaro, 1992, p. 110), and the growth of a throwaway society, where an object is used once then disposed of (Kang & Wimmer, 2008; McDonough & Braungart, 2002; Pizzocaro, 1992).

Clearly, therefore, “appliance life spans are determined by consumer behaviour as much as by design specification” (Cooper, 2004, p. 447). In fact, industrial societies are now throwing away objects before they have reached the intended built-in obsolescence. The majority of electronic appliances in use are less than five years old (Cooper, 2004): “60% of stoves and televisions are still functioning when they are thrown away and 80% of computers still function” (White et al., 2005, p. 39). Thus, perceived obsolescence drives consumption and disposal with even more force than the functional obsolescence previously described.

With this in mind, post-war economic boosts to raise the low standard of living in some countries have left a lasting, and not necessarily positive, imprint. Life-spans of products are decreasing, which propels the hasty replacement of functioning objects, thus further accelerating production, consumption and waste. Yet as early as the 1960s, researchers began warning that a waste crisis was in the making (Packard, 1960).
Unsustainable Patterns of Waste

Waste has always been generated by societies; the difference today is the type and amount of waste produced. Prior to industrialisation, most post-consumer objects would either biodegrade or could be burnt or buried safely (Ackerman, 2005); metals were the exception, but they were considered valuable and so were usually melted back down and reused (McDonough & Braungart, 2002). More generally:

Market-driven recovery of materials was not limited to organic waste. Recycling of durable materials and manufactured goods has always occurred, and probably represented a larger share of the supply of materials in the past. Historically, the motivation for recycling everywhere was the same as for night soil recovery [urban waste collected by farmers who used them to fertilise nearby fields] in Japan: materials were expensive and labor [sic] was cheap (Ackerman, 2005, p. 500).

Industrialisation increased production and consumption and, accordingly, disposal patterns also had to adapt to accommodate the growth of waste. In times of scarcity, industrialised societies would still nevertheless recognise and carefully collect and reuse valuable materials (Cooper, 2008; McDonough & Braungart, 2002). Today, cheap materials and processes have swamped markets (McDonough & Braungart, 2002) and informal market-driven recycling is lost as societies prosper (Ackerman, 2005). Waste is therefore rapidly increasing.

Most products contain only a small percentage of the materials used in their production. The majority of resources used in the manufacture of goods must be disposed of as by-products. As we have seen in the discussion above, this fundamental problem is now exacerbated by concepts such as planned obsolescence, subsequently increasing consumer disposal habits. Where, then, does all this waste go when thrown away? People neither create nor destroy matter, it is simply altered from one state to another (Fry, 2009; LeCain, 2009). That is to say, there is no ‘away’ when inorganic materials are ‘thrown away’; there are only landfills, incineration, and unofficial dumps such as rivers and oceans (Khajuria, Yamamoto, & Morioka, 2010). Further problems of unsustainability associated with waste disposal involve the mismanagement of landfills, the release of toxins through incineration and the plastic pollution of the world’s oceans (Dautel, 2009/2010; Moore, 2008).

Pollution arising from production and disposal of goods is clearly on the increase (Khajuria et al., 2010; Robinson, 2009; Sakai, Hayakawa, Takatsuki, & Kawakami, 2001). These include unsustainable production methods that exacerbate a culture of over-consumption. The following subsections explore the generation of unnecessary waste, firstly of e-waste and secondly regarding the growth of landfills, incineration and illegal dumping.

Emergence of electronic waste.

The problems of resource depletion and industrial pollution associated with the production of computers are compounded by the predominance of unwanted electronic
waste, usually called e-waste. E-waste comprises of computers, televisions, music players and mobile phones, whilst Waste Electrical and Electronic Equipment (WEEE) also encompasses non-electronic goods such as refrigerators and ovens (Robinson, 2009). Typically, the valuable materials contained in such goods are never recovered after the product’s lifespan; most electronic products end up in landfills (Barba-Gutiérrez, Adenso-Díaz, & Hopp, 2008; Robinson, 2009). Potential environmental contaminants of some electronic products, as previously indicated, consist of mercury, cadmium, nickel, polybrominated diphenyl ethers (PBDEs) and polychlorinated biphenyls (PCBs) which, once in landfills, can leach into surrounding soils and waterways (Lim & Schoenung, 2010).

E-waste is a growing global problem. In 2006, estimates of the global production of e-waste were twenty to twenty five million tonnes per year, and this was mostly produced in Europe, the United States and Australasia (Robinson, 2009). Nevertheless, China, Eastern Europe and Latin America will also become major e-waste producers over the next ten years (ibid.).

Meanwhile, in the US alone, the Environmental Protection Agency (EPA) estimated that in 2005, 304 million electronic items (between 1.9 – 2.2 million tonnes) were discarded. Around two-thirds of the items were still in working order. Of that 1.9 – 2.2 million tonnes, between 1.5 – 1.8 million tonnes went to landfill, and only about 345,000 – 379,000 tonnes were recycled (United States Environmental Protection Agency, 2008).

In order to overcome their ever-expanding amount of e-waste, some rich countries export large (just how large is unknown) quantities of e-waste to other, poorer countries (Robinson, 2009). Unfortunately, in some developing countries recycling facilities for dealing with electronic products, printed circuit boards for example, are immature (Huang, Guo, & Xu, 2009). In other countries recycling techniques can be equally crude, such as:

...burning and dissolution in strong acids with few measures to protect human health and the environment. Such reprocessing initially results in extreme localised contamination followed by migration of the contaminants into receiving waters and foodchains. E-waste workers suffer negative health effects through skin contact and inhalation, while the wider community are exposed to the contaminants through smoke, dust, drinking water and food. There is evidence that E-waste associated contaminants may be present in some agricultural or manufactured products for export (Robinson, 2009, p. 183).

In brief, energy and resource intensive processes produce valuable, but often toxic materials that are then used in vast quantities of electronic products. However, the majority of these products soon end up in landfills. Those resources not lost in landfill are generally being carelessly managed, potentially causing further harm to both people and to the planet. The following subsection considers what happens to other types of waste.
Landfills, incineration and illegal dumping.

Fresh Kills on Staten Island is one of the world’s largest landfills (Shanks, Platt, & Rathje, 2004). In 1990 it stretched over 3,000 acres (Goldstein & Izeman, 1990). The original plan for Fresh Kills, when it opened in 1947, was that it would be used for twenty years and then developed into a residential, recreational, and industrial multiuse area (Hall, Moses, & Mulrain, 1951). That plan was never realised. Instead, at its peak, 14,000 tonnes of residential and industrial waste was added to the site every day (Goldstein & Izeman, 1990). When closed in 2001, the landfill was more than sixty metres high (J. Lloyd & Mitchinson, 2008).

What made up this great volume of waste? A 1992 audit of some United States landfills found that forty percent of the content of landfill by volume was paper. Twenty to twenty-four percent of the volume was plastic. Most of the remainder was construction debris and backyard waste such as grass clippings and leaves (Rathje & Murphy, 1992). The rate of natural biodegradation was far slower than expected (ibid.). Heavy metals and toxic chemicals were also found in American landfills in 1992. In the case of the Fresh Kills landfill, which was unlined, black plumes of these toxins leached into nearby waterways (Goldstein & Izeman, 1990).

Much of the waste not ‘disposed of’ in landfills is burnt (officially or unofficially). Again, this has the potential to release harmful toxins into the environment (Khajuria et al., 2010; Sakai et al., 2001). Some developing countries are unable to handle the growing amounts of municipal waste (Khajuria et al., 2010). Inadequate official waste disposal infrastructure causes illegal dumping and burning of rubbish, often containing plastics, which may pose a threat to human health and to the environment when pollutants are concentrated (Khajuria et al., 2010).

A growing amount of discarded waste material is finding its way into rivers. The primary cause of this is illegal dumping (often termed ‘open dumping’). Such dumping includes “household trash, garbage, tires [sic], demolition/construction waste, metal or any other material,” which is abandoned at locations such as “roadside[s], vacant lots on public or private property, even in parks [anywhere] other than a permitted landfill or facility” (Khajuria et al., 2010, p. 652).

Waste dumped in these ways contributes to the collection of plastic gathering in oceans (Dautel, 2009/2010; Moore, 2008). Scientists lament:

Synthetic polymers, commonly known as plastics, have been entering the marine environment in quantities paralleling their level of production over the last half century. However, in the last two decades of the 20th Century, the deposition rate accelerated past the rate of production, and plastics are now one of the most common and persistent pollutants in ocean waters and beaches worldwide (Moore, 2008, p. 131).
Plastic pollution is a particular problem in the Pacific Ocean. Two enormous masses, dubbed the Eastern and Western Garbage Patches, have been found in the north Pacific subtropical gyre. The Eastern one alone is now estimated to be twice the size of Texas (Dautel, 2009/2010). The patches are hard to see however, because the loosely packed plastic floats below the surface of the water at depths of up to thirty metres (ibid.). The plastic ranges from plastic bags and bottles, to clothing, toys, and discarded fishing nets (ibid.).

Approximately eighty percent of this plastic comes from the land; most of the remainder is dumped from ships (ibid.). Land-based plastic items are often derived from consumer goods that contain, or were packaged in, plastic and have found their way into rivers and streams, which have then floated downriver into the oceans (Moore, 2008). A study led by Charles Moore in 2004-2005 sampled the Los Angeles and San Gabriel Rivers over three days and found that 2.3 billion pieces of plastic, a total of sixty tonnes, were floating out to sea (ibid.).

An alarming quantity of this plastic finds its way into the food chain. Moore found plastic particles in eighty species of seabird, eight of fourteen species of fish, and lobsters (ibid.). Particularly affected are seabirds such as the Laysan albatross that primarily feed on detritus found in the north Pacific subtropical gyre (ibid.).

Pollution from post-consumer goods is on the increase as more and more people populate the world, use more objects and packaging and discard their junk. Some of the interconnected root causes of unsustainability therefore embrace unsustainable production methods of goods that feed a culture of over-consumption. Over-consumption is itself stimulated by a ‘throw away’ culture characterised by planned obsolescence, one result of which is unsustainable levels of waste.

The ways in which we manufacture, consume and dispose of everyday objects such as laptop computers cause considerable resource depletion, industrial pollution and electronic waste. This subsection has reviewed some root causes of global unsustainability and explained that, although each is a single-issue, all are interconnected through patterns of production, consumption, and waste.

The Conflicts of Sustainability in New Zealand

In relation to Hopkins and McKeown’s (2002) assertion regarding the difficulty of envisioning a sustainable world, the situation in New Zealand can be seen in a positive light. Local and central government publishing strategies such as See Change, alongside active citizens promoting generosity, volunteering, social enterprise and grass roots campaigns in combination with education and businesses working towards being socially responsible, suggests that some New Zealanders are forward thinking and engaged.
It is widely accepted that introducing sustainability into business is challenging (Higgins & Walker, 2010; Milne et al., 2004; W. Norman & MacDonald, 2004). For some, the difficulty is related to accountability to shareholders (Norman & MacDonald, 2004). For others, it is due to a lack of expertise and capital, especially for 98% of small and medium-sized enterprises (SME) found in New Zealand (Collins et al., 2007). Research shows that some businesses and organisations (such as the New Zealand Business Council for Sustainable Development), rely heavily on what is commonly called ‘the journey metaphor’, which does not necessarily ensure a common understanding of sustainability (Milne et al., 2004). For instance:

‘Sustainability as a journey’ is, we contend, both a prevalent metaphor in businesses’ representations of their engagement with sustainability and a powerful one that predisposes understanding of sustainability as some kind of end process rather than a particular kind of end-state (Milne, Kearins, & Walton, 2006, p. 802).

A critical exploration of the concept discloses that some of the same companies indicate that “it is not possible to define an end point for sustainability or sustainable development, which rather begs the question how it is possible to measure progress towards sustainable development?” (Milne et al., 2004, p. 21). This problem highlights the complexity of defining the scope and also identifying any straightforward definition of sustainability. It also draws attention to ways in which key concepts of sustainability can be omitted from business responsibilities. In particular, campaigns determined at the outset of the development of the Business Council, such as “concern for ‘social and ecological limits’, ‘future generations’, and protecting ‘ecological systems’ and ‘life-sustaining functions’, as well as dealing with unsustainable ‘patterns of production, consumption and waste management’,” have become less prominent as a result of the Business Council’s move towards a more reformist and incremental strategy (ibid., p. 20). So the metaphor, “sustainability is a journey and not a destination” (Chapman & Gant, 2007c; Milne et al., 2006) can inhibit the introduction of sustainability into business.

Moreover, a lack of understanding of the complexity of sustainability can also be responsible for promoting unsustainable actions. The Warehouse, for example, a founding member of the Business Council, promotes itself as a good corporate citizen that aims to improve the impact of its business through working in partnership with the community in order to improve the social and environmental well-being of members of the nation (Higgins & Walker, 2010). Specifically, in their Triple Bottom Line Report, one target is “making a difference to New Zealand by making the desirable affordable” (The Warehouse Triple Bottom Line Report 2003, p. 23, as cited in Higgins & Walker, 2010, p. 17). Making the “desirable affordable” generally undermines sustainability initiatives, as it usually fuels the rapid replacement of objects through planned and perceived designed obsolescence. This is precisely the type of complexity that leads to conflicts between business goals and sustainability commitments and is a motivation for this research.
In brief, approaching sustainability is a complex problem and, as such, integrating it into higher education or into a business is challenging. Despite the challenges, some educator, communities and businesses in New Zealand are beginning to build a strong sustainability model of action, research and implementation. However, as the work of Marcus Milne, Helen Tregidga and Sara Walton (2004) indicates, understanding and implementing action towards sustainable development for businesses in a small and relatively isolated country can cause discrepancies between what is said and what is done.

Research Problem, Questions and Methodology

It is this challenge to implement sustainability that motivates me as a designer, educator, activist and researcher in New Zealand, to explore, interpret and understand the problems of unsustainability, and thus contribute to scenarios towards a more sustainable future. Current levels of production, consumption and waste are unsustainable, and this is partly due to the effects of design; thus, design needs to become part of the solution to this problem and education is key. Therefore, the specific problem addressed in this research is:

Change is often facilitated through education, so how might sustainability be integrated into the teaching and practice of design (and to what extent is it already) in Aotearoa/New Zealand?

In order to address this research problem and investigate different ways sustainability is included or integrated into the teaching and practice of design, specific research questions focus the data gathering. These are:

1. What are the commonalities and differences in meanings of design and sustainability for different groups of designers (international experts and Aotearoa-based teachers, students and practitioners)?
2. In what ways is sustainability included in the teaching and practice of design?
3. What are the implications of different understandings of design and sustainability on the inclusion of sustainability in the teaching and practice of design?
4. What are the drivers for the inclusion of sustainability in the teaching and practice of design?
5. What obstacles exist that potentially hinder the inclusion of sustainability in the teaching and practice of design?
6. How might obstacles become opportunities for the inclusion of sustainability in the teaching and practice of design in Aotearoa?

To refine the research problem and associated research questions, international literature in societal conceptions of design, theory, teaching and practice of design, sustainable design, sustainable education and sustainable design education is reviewed in Chapter two. Justification for the research is explored through what Tony Fry calls the “defuturing condition of unsustainability (which is the essence of any material condition of unsustainability as it acts to take futures away from ourselves and other living species)”
(2009, p. 1) [brackets in original]. To locate the research within a national context, I have reviewed current sustainability initiatives from four different sectors in this island nation that led to an exploration of the complexity of global unsustainability, which underpins the complications of sustainability implementation in New Zealand.

The activity of designing objects sits within the overarching title of production, which ultimately impacts on current levels of consumerism in society. In Aotearoa, members of the Business Council have achieved some successes in terms of addressing sustainability. However, some of the more complex issues associated with unsustainability still lack attention; for example, social and ecological limits (specifically in terms of future generations), the protection of ecological systems and the improvement of unsustainable patterns of production, consumption and waste management (Milne et al., 2004). It is claimed that avoidance of these particular types of issues can be common in Western societies due to the inherently unsustainable way most businesses are organised (ibid.). For instance, dependency on fossil fuels, or the sale of cheap, breakable objects imported from overseas (Higgins & Walker, 2010).

Research reported in this first chapter shows that, after the post-war depression, an increase in the consumption of goods was promoted to boost damaged economies. The level that consumption has reached today, however, is argued by many to be unacceptable and unsustainable (Chapman, 2009; Kang & Wimmer, 2008). A variety of different approaches to alter current patterns of production and consumption are underway. In the second chapter, I examine these approaches which range from incremental change (such as a switch in materials and recycling initiatives) through to a move from designing products to designing services, and into a deeper exploration of designers’ roles in shaping fundamental behavioural change. A key proposition is that much of what is currently produced and consumed is unsustainable, and much of that is driven by design, meaning design is a major contributor to methods of production and consumption levels.

Thus, the first chapter of the thesis frames the problem. The second chapter then goes on to unpack complexities associated with design, consumerism, sustainable education and sustainable design education. Subsequently identifying a gap in the literature specifically relating to the place of sustainability in tertiary design education in New Zealand. While the fields identified above are explored in the existing literature, there is a paucity of relevant information that guides sustainable design within a higher education context, and even less that pertains specifically to New Zealand. The following section, therefore, introduces the research objectives and structure for this study.

**Overview of Methodology**

In reflecting on my personal context (Chapter three), I specifically acknowledge how sustainability and design thinking underpin my worldview. This foundation has evolved
through my unique experiences, and because I understand knowledge to be a social construction of interpretation and the making of meaning. These ontological and epistemological assumptions, combined with my personal context, are highly influential in establishing the research problem, which in combination with the literature review, confirm the six research questions.

I focus specifically on the teaching and practice of design in Aotearoa/ New Zealand, drawing on expertise from around the globe, both through the review of literature and through interviews. In other words, by way of a qualitative research approach using principles of grounded theory and comparative case studies, I have gathered open-ended, in-depth interview data through purposive sampling of sixty-four interview participants from four sample groups of designers. In particular, the sample includes international experts (academics known to specialise in sustainability and design) and teachers (both academic and practice based), students and practitioners from New Zealand. This scope of sample groups represents a range of theoretical and practical voices from design education and business (described in more detail in Chapter three).

A pilot study of fifteen international academic experts was conducted in 2007; the remaining participants were interviewed in 2008 in New Zealand. The interviewees were asked what design, sustainable design and sustainability meant to them, as well as predetermined probing questions where necessary. A pragmatic grounded theory approach to analysis, also known as inductive analysis, enabled categories to emerge from the data through the constant comparative method. Using this method, each research question is addressed and explained in four findings chapters (Chapters four to seven). The comparison of results for each chapter creates a foundation for comparison for the next; thus, specific findings are briefly discussed at the end of each chapter.

In brief, I will use different approaches to investigate how sustainability is becoming part of the teaching and practice of design and examine the influences of different meanings on these approaches. Chapter four is concerned with the wide variety of meanings relating to understandings of design and understandings of sustainability. Similarities between the two are identified and lead into the fifth chapter, which examines the approaches to the inclusion of sustainability in tertiary education of design and design in business. Chapter six highlights drivers for the inclusion of sustainability in design and the seventh chapter focuses on relevant barriers.

The overall intention is to build a foundation of knowledge from the international experts in relation to their experiences of sustainability in design, analyse their practice and offer recommendations to overcome emergent obstacles. Therefore the final chapter (eight) draws the research study to a close and focuses on how obstacles can become opportunities for integrating sustainability into the design of designers.
Summary and Conclusions

This chapter laid the foundations for the remainder of the study. The context for the research is design and sustainability in higher education in Aotearoa. However, including sustainability in the teaching and practice of design is not straightforward. There is a distinct lack of an ideal state, which renders learning for a more sustainable future elusive. Four-fifths of the way through the UN Decade of Education for Sustainable Development, I think we should feel encouraged that sustainability appears to be an issue that has recognised importance within education and business. Even more promising is an interest in developing the integration of sustainability further; the identification of obstacles and areas of potential improvement will aid future integration. There still needs to be a continued advancement of knowledge and awareness of sustainability among teachers and practitioners as it relates to design so that students can be best prepared for the realities of industry facing a commitment to sustainable practices. On these foundations, the study can proceed with a critical and informative review of current literature concerning how designers can contribute to more sustainable patterns of production, consumption and waste.
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Introduction

The previous chapter outlined the broad field of study for this research, introducing current sustainability plans and action in New Zealand, associated complexities on a more global scale and how these complexities can cause conflicts at a national level. Although sustainability initiatives are underway in government, community, education, and business sectors a reductionist, environmental focus has slowed implementation (Baumgartner & Korhonen, 2010; Freeman, 2007; Freeman & Thompson-Fawcett, 2003; Milne et al., 2006; Milne et al., 2004; Parliamentary Commissioner for the Environment, 2002). This background information led to identifying some of the complexities of designing scenarios for a more sustainable future, which is a concept further explained in this second chapter. Building on Hopkins’ and McKeown’s (2002) observations that it is easier to explain what is unsustainable in our societies as opposed to describe what is sustainable, I justified my research through highlighting unsustainable patterns of production, consumption and waste. In this way framing the problem for the remainder of the study.

This chapter (Chapter two) focuses on research associated with the bottom four layers of the diagram from the previous chapter (see Figure 1.1). From these four layers, the first two: Social Conceptions of Design & Theory, Teaching and Practice of Design, Sustainable Design are central to the argument. The third layer: Sustainable Education contains essential perspectives pertinent to the argument which inform the last topic (and bottom layer) to be explored: Sustainable Design Education.

The first and second sections of this chapter, therefore, concern the complexities of design, arguing there is a significant difference in social conceptions of design compared to more academic conceptions associated with design theory, teaching and practice, leading to a variety of approaches to the process of and teaching of design. In these two sections I aim to show how designers are active contributors to change because of their role in society, which leads into the third section where I intend to illustrate how notions of social responsibility were present in the Arts and Crafts movement of the nineteenth century. In this third section I investigate the breadth of international research in sustainable design, and structure the argument around unsustainable patterns of production and consumption identified in Chapter one. In particular drawing attention to differences between individuals’, industries’, and designers’ responsibility to change patterns of consumption. In the penultimate section I introduce how sustainable education is changing, moving from a focus on environmental issues to incorporating social, cultural, political and economic problems as well. I specifically highlight a dearth of literature relating to sustainable education in New Zealand, a conclusion further asserted in the final section of this chapter that specifically focuses on sustainability in design education.
Social Conceptions of Design

The meanings of the word design are multiple, being both a noun and a verb, and used in different ways by different kinds of designers. As a noun design now means, among other things, “‘intention’, ‘plan’, ‘intent’, ‘aim’, ‘scheme’, ‘plot’, ‘motif’, [and] ‘basic structure’” (Flusser, 1999, p. 17). As a verb design can mean “‘to concoct something’, ‘to simulate’, ‘to draft’, ‘to sketch’, [and] ‘to fashion’” (ibid.). As John Walker points out, design:

...can refer to a process (the act or practice of designing); or to the result of that process (a design, sketch, plan or model); or to the product manufactured with the aid of a design (designed goods); or to the look or overall pattern of a product (‘I like the design of that dress’) (J. A. Walker, 1989, p. 23) [brackets in original].

Traditionally, practicing designers were stylists and even though design has evolved, this initial impression of the profession has left lasting imprints on the non-design community (Fry, 1999). In other words, design is not restricted to the traditional understanding of the verb ‘to draw’ but is adopted globally to describe a wide variety of images, objects, services, systems, actions, occupations and environments.

In the previous chapter I highlighted Heskett’s definition of design as “the human capacity to shape and make our environment in ways without precedent in nature that serves our needs and gives meaning to our lives” (2002, p. 10). In the following subsections, and without redefining existing definitions of design, I will use the three interconnected aspects of Heskett’s conception of design: ‘shapes,’ ‘serves,’ and ‘gives meaning,’ as a framework with which to explore variations in understanding and meaning. I aim to build an argument that supports the notion that designers are active contributors to social change.

Design is About Shaping

Heskett’s (2002) reference to shaping can be applied to the profession of design and also the process of designing, which itself shapes in different ways. Firstly, design as a profession is being shaped. Prior to the 1930s, craftspeople such as carpenters, painters or stonemasons made their own objects, perhaps according to a required specification based on a need (Molotch, 2003). In contrast, today, the act of designing is an occupation in its own right. Some claim the idea of design as a practice or occupation in and of itself can be traced back to 1698 when Thomas Savery patented the first steam engine (Fiell & Fiell, 2006). Others suggest modern design commenced with architects transferring their knowledge from the building to the interior space and then to the objects that fit within the space (Sparke, 1998). This sparked ongoing arguments that there needs to be greater understanding of design as a newly evolving profession (Heskett, 1987; Molotch, 2003). Now, designing is a multi-disciplinary activity and is often better achieved by a team rather than by an individual designer working alone (Breslin, 2008; Heape, 2007; Micklethwaite, 2003; Rothstein, 2002). Some designers will work as consultants or as employees within a company, often called the “in-house” design team (Molotch, 2003, p. 24) or the “product
development team” (Ulrich & Eppinger, 2000, p. 26) depending on the specialisation. In recent years design as a profession has been fragmented into subsidiary occupations (Fry, 1999; Love, 2000b; Stegall, 2006). More common design professions are listed below. The list is not exhaustive but it highlights distinct differences between each.

- Architectural design, which relates to the creation of buildings;
- Communication design (also graphic design or visual communication), which relates to two-dimensional communication of information;
- Engineering design, which relates to the planning and production of mechanical or electrical components;
- Environmental design (this can also refer to ecological design, which is explored later in the chapter), which relates to the built environment, and can include architecture, city or urban planning, landscape architecture, and interior design;
- Fashion design, which relates to clothing created with retro or contemporary social influences;
- Furniture design (also can be found within industrial design), which relates to the production of interior or exterior furniture, such as chairs, tables, beds and sometimes lighting;
- Interaction design, which relates to the relationship between people, products and systems;
- Interior design, which relates to space planning and objects within four walls: windows, doors, finishes, textures, lighting, furnishings and sometimes furniture;
- Product design (also industrial design), which relates to tangible, physical artefacts but not necessarily with an industrial focus. Product design sometimes includes furniture and lighting design;
- Service design, which relates to the activity of planning and organising people or infrastructure, communication or material components;
- Strategic design, which relates to design thinking, planning and increasing business’s creativity, innovation, and ultimately, profit;
- System design, which relates to the process of defining the components, modules, interfaces or architecture to create a ‘system’;
- Textile design, which relates to the creation of new fabrics and materials;
- Web design, which relates to the interface between users and information online.

The list shows a wide range of occupations that can be connected to the term ‘design’. Some of these began as craft or trade based activities and have developed into complex, multi-layered, company-based critical systems, and certainly professions (Bœuf, 2006; Jonas, 2001; Manzini, 2006).

What is often confusing is that ‘product design’ is the profession most commonly referred to, but this is perhaps the most ambiguous usage, because the word ‘product’ can incorporate all of the other professions. For example, Richard Buchanan argues “by ‘product’ I mean a range of phenomena that is very broad, including information, artefacts [sic], activities, services, and policies, as well as systems and environments” (2001, p. 7). Moreover, the “ability to visualize and to bring visions into concrete experience is the ability of design” (Buchanan, Doordan, & Margolin, 2010, p. 7). Both statements suggest something of the breadth of field covered by the profession of product design: not only do they refer to designed outcomes of a wide variety but they also highlight the ability of designers to create
and subsequently make, shared visions. In this way designers can play an important role in creating shared visions needed for creating change.

Globalisation has both challenged and enabled design to broaden imperceptible boundaries (Fiss, 2009). For instance, design “is called upon to reference national identity or recast the vernacular” (ibid., p. 3). Design is used to address “the branding of place as a means of reinforcing cultural identity and expanding opportunities in international trade and tourism,” and also to “highlight the political and social significance of the varying forms of cultural hybridity that have emerged out of our postcolonial and internationalized capitalist condition” (ibid.). Thus, local and global perceptions of design professions are changing.

Secondly, the process of designing focuses on shaping specific outcomes of the evolving professions (listed above) in a variety of ways. Distinct processes are critiqued in more depth in the following section, where the resulting argument divulges the complexity of the creative process. Here, in this subsection, the idea that design is shaping relates to how the different professions of design create images, objects, activities, environments, and systems. Professional product designers, for example, employ multiple approaches to ensure that the designed outcome gains an optimum place in a competitive marketplace. Designers are called on to be creative and to solve problems using a variety of processes and techniques. Product innovation is one such approach and was originally used to decrease company costs (Utterback & Abernathy, 1975); more recently innovation is used to increase competitiveness (Christensen, 1995; Gemser & Leenders, 2001). Other types of innovation, such as technological innovation, have been identified as important processes for not only the betterment of product but also for the betterment of design and design strategy (Gemser & Leenders, 2001). The process of innovating is, however, unpredictable and can arise from unanticipated directions and lines of inquiry (Utterback & Abernathy, 1975).

In contrast, the importance of improving products through a more controlled and research based approach rather than through variable bursts of innovation has more recently emerged. Richard Buchanan (2001), and Jonathan Cagan and Craig Vogal (2002) emphasised shaping based on the human experience with the designed object or service. They argued for the creation of products that were ‘useful’, ‘useable’ and ‘desirable’. The notion of usefulness took into consideration the users’ point of view and challenged the primacy of the object’s function. The notion of usability ensured that the product was fit for purpose, whilst desirability determined the product’s appeal and level of consumer engagement. Successful products were deemed to be those that met these criteria (Buchanan, 2001; Cagan & Vogel, 2002). Evidently, unsuccessful products do not meet these criteria. An example of an unsuccessful product would be one that provokes feelings of frustration when in use. For instance, most old VHS (Video Home System) video recorders (often called VCRs) had large numbers of buttons and symbols, the purpose of which were often confusing and seemed illogical to the users, in this way video recorders were challenging objects to understand and
use. Donald Norman (1998) suggests such objects need a graduate from MIT to operate them. These types of products provided no cues or incorrect cues in how to use them, which slowed the process of interpretation and understanding, which in turn caused frustration for the user, hence the product failed on usability (ibid.).

The characteristics of shaping described here address how the design profession itself has been shaped over time. Similarly, the activity of designing involves processes to shape the end result of each profession, through innovation and creating useful, useable and desirable outcomes. The results of the activity of designing can shape and make environments through how they serve needs (encompassing being useful) and how they give meaning to lives (including being desirable). In the next section I explore how design serves needs.

Design is About Serving

The second aspect of John Heskett’s (2002) definition is that design serves needs, the meaning of which has also changed over time. The highly ornamental Art and Crafts movement, which prospered between 1880 and 1910, emphasised a mastery of craft, defined through objects built for the perceived needs of an affluent society. In the 1940s, however, a different relationship with a changing market place emerged. Designers became preoccupied with stylising artefacts to solve the problem of post first world war under-consumption whilst making the most of modern industries and mass production (Fry, 1999; Margolin, 1995; Micklethwaite, 2003; Molotch, 2003; Whiteley, 1993; A. Willis, 1999).

Individual design philosophy and personalised design processes are influential in defining needs. The argument of perceived needs and how they are best served by designed outcomes is a complicated one (Fry, 1992) and is central to how design is conceptualised. “No design works unless it embodies ideas that are held in common by the people for whom the object is intended” (Forty, 1986, p. 245). This proposition raises questions over the emphasis often placed on the need for functionality (how the designed outcome functions) over aesthetics (how the designed outcome appears). Form and function are integrally related but clearly separate. An emphasis on one over or at the expense of the other is a result of differences in philosophy and process, thus influencing whether outcomes serve functional or aesthetic needs.

Debate over the importance of form over function, or vice-versa, has lasted for over a century. Architects, artists, and designers of the Arts and Crafts movement practiced fidelity to their materials, valued traditional craftsmanship, often through the use of simple forms, and attempted to rationalise and categorise ornament (Naylor, 1990). Designers and advocates from the Arts and Crafts movement proposed economic and social reform and were arguably anti-industrial (ibid.). However, Adolf Loos shunned the focus of the craft in his 1908 publication Ornament and Crime in which he argued “[t]he evolution of culture is
synonymous with the removal of ornament from objects of daily use” (Loos, 1908, p. 30). This notion was further explored by Frank Lloyd Wright, along with Walter Gropius and Peter Berlage, who promoted an “ideological commitment” to “formulating and disseminating the aesthetic” (Heskett, 1980, p. 62). Such a commitment exemplified the canon, ‘form follows function’, and moved the emphasis from aesthetic to functionality.

It is significant that the origins of the dictum ‘form follows function’, can be traced back as far as 1896 and the American architect Louis Sullivan. He suggested that the “universal law ‘form ever follows function’ should be applied to high rise structures” (cited in C. Willis, 1995, p. 14), although he was not referring to the physical form of the building but to the “symbolic expression of different interior use on the façade,” (ibid.). The dictum was not popularised until the early part of the twentieth century where it was reduced to the famous phrase, indicated above, of ‘form follows function.’

The debate that followed is yet to be settled. In the latter part of the twentieth century ‘function’ has been exchanged for ‘fiasco’, ‘meaning’, ‘finance’ and more recently, ‘service’. Peter Blake (1977) heavily criticised functionalism, especially in modern architecture, and argued that the popular maxim was fundamentally flawed. He explained that the “environment we have built over the past century or so with supreme confidence is literally collapsing;” he renamed the dictum “form follows fiasco” (1977, p. 11). Later, Klaus Krippendorff adopted the phrase “form follows meaning,” and asserted that designed objects could better serve users if designers, “discuss not only the contexts in which their forms are used, but also how these forms are made sense of or what they mean to someone other than themselves” (1989, p. 15). Revisions of the original continue, such as “form follows finance,” indicating that the designed outcomes’ aesthetic responds to the “vernacular of capitalism” (C. Willis, 1995, p. 16) rather than its function. More recently, there is “form follows service” (Ueda, 2009, p. 177), a notion emphasising the importance of service over physical goods.

Yoshihiro Ueda’s “form follows service” (ibid.) has summarised an argument over research that indicates some consumers want their needs met through experience, rather than through owning ever more goods. Similarly, Carlo Vezzoli and Dalia Sciama have observed:

The concept of PSS [Products-Service Systems] introduces a new interpretation which moves from the product as the physical result of an industrial process, to the product as an integrated whole of mutually dependent products and services for meeting specific customer demands (2007, p. 201).

These arguments point to a movement within design from an emphasis on the physical product to an emphasis on service (Cooper & Evans, 2000). The shift opens up the discipline to a broader audience, with a much broader spectrum of solutions (Buchanan & Margolin, 1995; Cipolla, 2006). Indeed, some academics suggest that service industries will become the dominant model of production and consumption of design in the future (M. B.
Cook, Bhamra, & Lemon, 2006, p. 1455). Ezio Manzini and Vezzoli (2002, p. 3) described the concept of Product-Service Systems, promoting “a focus shift from selling just products to selling the utility, through a mix of products and services while fulfilling the same client demands with less environmental impact.” This shift from private ownership to Product-Service Systems permitted customers to benefit from products, focusing on satisfaction as a value, whilst the producer (or other specialist individual) retained ownership (Manzini & Vezzoli, 2002; Tukker & Tischner, 2006; Vezzoli & Penin, 2006). The introduction of Product-Service Systems marked a turning point from individual consumerism to a more participative model. The importance of this shift indicates a joint responsibility shared by designers and consumers towards sustainable consumption, which reflects aspects underpinning this thesis and further explored towards the end of the chapter.

Lastly, a further movement in how design serves needs is evident. Research suggests that design is shifting from focus on ‘posters and toasters’ (namely graphic and product design) towards design as interaction, processes, systems, and organizations (Buchanan, 2004; Neumeier, 2009). The form and function argument gives way to a focus on the human experience, much like the previous subsection that emphasises useful, useable and desirable (Buchanan, 2001). Such a use for design within businesses may be beneficial, especially in terms of shaping brands and serving customers needs (Payne, Storbacka, Frow, & Knox, 2009), or moving away from analysing consumer research and instead moving towards design thinking (Martin, 2009). Marty Neumeier proposes that “design drives innovation, innovation powers brand, brand builds loyalty, and loyalty sustains profits” (2009, p. 49). Evidently design is being recognised as adding a broader value to a business than just creating beautiful, functional or technical objects, information or services. Thus, design can deliver value by improving the scaffolding of business.

These features of design have captured the notion of serving, and I have explored how design as a profession can serve perceived needs, whether aesthetic, functional, technological, or experiential. These needs are not fixed but change over time and place. Moreover, the uses for design are increasingly recognised by business, as a service that can drive innovation, brand, loyalty and profit. The next section considers how design can give meaning to individual people’s lives.

**Design is About Giving Meaning**

Described above are the first two aspects of John Heskett’s (2002) definition (shaping and serving), both of which are underpinned by the third aspect: design gives meaning. I use this aspect in three ways. Firstly I consider the meanings given to design, such as those referred to in the last two sections: how design as a profession is itself being shaped, and how design as a profession shapes outcomes, also how design has the ability to serve perceived needs. While these meanings are not addressed further in this chapter, later in the
thesis it will become evident that the way in which design is understood affects approaches to design, including the way design is taught, and how it influences different understandings of sustainability. Secondly I examine the specific type of value that is associated with design; one based on aesthetics and perceived associated benefits. Thirdly, I suggest that the way in which people interact with designed objects gives meaning to them, subsequently shaping their world. These latter two explanations of design as giving meaning are explained here.

The second way in which I want to explain how design gives meaning focuses on desirability and seduction. The desirability and seductiveness of objects are examples of a ‘non-monetary design value’ (introduced in Chapter one), which is often associated with social practices that emphasise style over function (Micklethwaite, 2003). This concept resembles the ‘form over function’ dictum from the previous subsection.

In this subsection then, the focus is on the way objects are valued through perceived benefits, and sometimes at the expense of functionality. Aesthetic and perceived associated benefits are often valued over and above the objects’ original purpose, in a way not dissimilar from that of the Arts and Crafts movement, where beautiful objects were accessible only by the elite due to their expense. In the 1980s, a similar objectification was captured by the new term ‘designer’, a fashionable, transient meaning of design illustrated by concepts such as ‘designer jeans’ (J. A. Walker, 1989). John Walker argued “since all jeans are designed the adjective [designer] was redundant but its use demonstrated how ‘the design’ was being perceived as a desirable attribute rather than the product as a whole” (ibid., p. 24).

Some consumer objects provide an externalised identification for individuals, specifically of who they are, what they do, or how they wish to be seen. These emotional connections to items can be seen through careful and intentional selection of cars, electronic devices, clothes, and houses – choices based on the perception that the object suits the persona of the individual. For example:

We all know someone who has been seduced by technology—a friend who was first to own a Palm Pilot, who had to have a Bang and Olufsen stereo, who proudly owns a limited-edition 20th Anniversary Macintosh, or who worships a Porsche Boxter as if it were a minor deity. Extending beyond the range of mere technology, the seductive power of the design of certain material and virtual objects can transcend issues of price and performance for buyers and users alike (Khaslavsky & Shedroff, 1999, p. 45).

These examples of objects are ones that provide an expansion of individual’s self-image. From this description it can be seen that designed objects affect the way people experience and interact with the world (Chapman, 2009; Heskett, 2002; Micklethwaite, 2003; Molotch, 2003).

The desirability of designed objects is triggered by an immediate emotional response; whether the object functions or not becomes relatively unimportant. A good example is the
successful product, the Juicy Salif (Figure 2.7), a citrus squeezer designed by architect and industrial designer Philippe Starck and produced by Alessi in 1990. In 2003, it had “sold 550,000 units, at a steady rate of 50,000 a year since its launch” (P. Lloyd & Snelders, 2003, p. 238).

Figure 2.7. ‘Juicy Salif’, by Philippe Starck, produced by Alessi in 1990 (copyright Alessi)

The Juicy Salif does not actually function well as a citrus squeezer (P. Lloyd & Snelders, 2003), due to being “designed for novel appeal and short term use” (Vienne, 2003, p. 244). Is that, however, its primary purpose? Norman further asserts:

Starck is rumored [sic] to have said, ‘My juicer is not meant to squeeze lemons; it is meant to start conversations.’ Indeed, the version I own, the expensive, numbered, special anniversary edition (gold plated, no less), is explicit: ‘It is not intended to be used as a juice squeezer,’ says the numbered card attached to the juicer. ‘The gold plating could be damaged if it comes into contact with anything acidic (2004, p. 114) [brackets in original].

Norman, for one, overlooked its ineffectiveness due to his overwhelming desire to own the odd but interesting object. In his research on why strong emotions of love and hate are provoked by everyday objects, Norman found that an understanding of the aesthetics of designed objects comes from three levels: “visceral” meaning surface beauty, “reflective” meaning deep, semantic and interpretive beauty, and “behavioural” meaning the beauty of usage (2004, p. 21). He uses the image above (Figure 2.7) on the cover of his book, explaining:

That juicer was indeed seductive. I saw it and immediately went through the sequence of responses so loved by merchants: ‘Wow, I want it,’ I said to myself. Only then did I ask, ‘What is it? What does it do? How much does it cost?’ concluding with ‘I’ll buy it,’ which I did. That was pure visceral reaction. The juicer is indeed bizarre, but delightful. Why? (2004, p. 113).

For some then the Juicy Salif is an identity symbol with aesthetics that are “strikingly sculptural and perhaps inspirational” (S. Walker, 2006a, p. 30). Evidently, the Juicy Salif is an expensive and iconic product that provokes intense emotions; it is an object of desire that has forfeited functionality for aesthetic. This sort of seduction by certain products has been
around for a long time as I suggested in the previous chapter, where I explored root causes of unsustainability and highlighted the concept of perceived obsolescence, in which consumers dispose of objects currently out of favour, despite being fully functional.

However, designers have the opportunity to give deeper meaning to products than just an initial burst of seduction (Khaslavsky & Shedroff, 1999). Designers can influence the longevity of products through emotional durability, which can strengthen consumer engagement with objects (Chapman, 2009). In other words, outcomes can be designed for emotional but novel appeal and short-term use, or for emotional durability and long-term use.

A third way in which design gives meaning is the specific way in which people interact with their designed objects. This interaction can be influenced by the designer or by the object itself. Often, the influence of the designer is hidden (Buchanan & Margolin, 1995). For example, interactions with an object may remain unnoticed because its clear operational cues (from the designer) make it easy to understand and accept (D. Norman, 1998). For instance, using a landline telephone is straightforward. A cord connects the handset to the main unit, keeping it correctly orientated. The location of the dial tone makes it obvious where an ear must be placed in order to hear the tone, and with the correct orientation of the handle the mouth is directed towards the transmitter. The phone has distinct digits that ask to be pressed, and the change in dial tone notifies the outcome. All of these operational cues are designed into the product, thus making it useable, and the interface between the user and object hidden.

Often overlooked in the meaning of design is how the product itself can influence the way it is used. Here, “the designed object as much designs the actions of its user as the designer of the object designs what the object can do” (A. Willis, 1999, p. 8), and “no artificial device will work only according to its designer’s intention” (Negrotti, 2001, p. 15) [emphasis in original]. For example, the Apple iPhone demonstrates how an electronic device can change the way people interact with a phone.

Before the iPhone, every smartphone on the market had a little screen, a tiny keyboard, and a user interface that confused even the experts. Then, in June of 2007, everything changed. In the three years since the introduction of the first iPhone, we’ve seen a tremendous change in the way that people work with smartphones and computing devices in general (Sande & Sadun, 2010, p. xiv).

The iPhone revolutionised the way people interface with smartphones. They allow users to install and use whichever applications suit their needs and desires (Verkasalo et al., 2010). Thus, individualising each iPhone for its user, who learns to use their iPhone in unique ways, and in the process develop a relationship with it. “It is this developing relationship with a particular product that clearly gives value to the consumer. Equally it is a relationship that cannot be determined—and hence intended by—the designer” (P. Lloyd & Snelders, 2003, p. 245). In a similar way, “everything designed keeps designing” (Fry,
1999, p. 6), just as the iPhone designs how its user interacts with it, a table grows from a wooden object to become the centre of social relations of a meal (ibid.). Conceivably, design gives meaning by affecting people’s actions.

In this subsection, I have explored how design can give meaning. Design can add value, and act as a marketing trigger to promote product consumption or make objects emotionally seductive and desirable. Moreover, the way consumers interact with their designed objects is influenced by the designer or by the object itself. This suggests designers are active contributors to social, cultural, environmental and economic change.

**In Summary, Designers are Active Contributors to Continual Change**

On the whole, design as a profession has been shaped over time, whilst the process of design refers to the shaping of a wide variety of outcomes (from each of the different professions). Design also represents the form or function of everyday information, objects, activities, services, policies, systems and environments, and which can become invisibly embedded within society, serving individuals actual and perceived needs. Design also refers to the meaning associated with the shaping and serving of design, also a type of value that is not based on money, and significantly, how interactions with specific objects can create new meaning. In other words, designers have the ability to shape, make and give meaning to people’s lives, thus designers are active contributors to continual change.

Overall, this section has given an overview of a more global meaning of the word design, implying that design has a broad impact on everyday lives. The aim was to provide a social and cultural review of the meaning of design. The different explanations of design elaborated in this section are augmented in the following section, as design from a more scholarly perspective is critiqued.

**Theory, Teaching and Practice of Design**

The previous section suggested that the word design has a global and societal meaning in the world and can be conceived in many different ways, especially for the non-professional designer. I used John Heskett’s (2002) notions of design as shaping, serving, and giving meaning as a framework to discuss some of the differences in conceptions of the word. This second section extends these meanings to include more theoretical conceptions of design, which includes teaching and practice. I propose that these more scholarly understandings of design can be considerably different from the societal understandings identified in the previous section.

Design as research is born out of a practical subject, but is ever-expanding in breadth and depth as theory and practice entwine to put pressure on previous disciplinary boundaries. As compared to the depth of research found in the sciences or the humanities,
in design “there has been precious little interest in what might be thought of as ‘classic’ research” (Owen, 1998, p. 9). Today there is more interest, especially in the depth of research, and understanding of design as the discipline morphs and expands (Buchanan, 2010). It is increasingly clear that design research cannot be pigeonholed; rather, it is:

...an interdisciplinary form of inquiry categorized in multiple ways, including: research with a focus on theory, practice, and/or production, as design epistemology, design praxiology, and design phenomenology, and humanities-based design studies (Almquist & Lupton, 2010, p. 3).

Considered in this expansive way, design as research builds upon the societal meanings of design described in the previous section. The subsequent critique of the historical and current discourse around design that this section describes facilitates a deeper understanding of the complexity of the discipline and how it can be communicated in teaching and practice.

**Design as a Discipline**

Despite its lengthy history within literature, design as an academic discipline is still emerging. “Individuals have published on the subject almost from the time design was recognized as something to be taught (engineering and architectural design theories have been in the literature since Roman times)” (Owen, 1998, p. 9) [brackets in original]. This subsection aims at unravelling some historical roots of design, which is a necessity for building a theoretical framework in the following chapter, and for subsequent discussions in the four findings chapters.

These theoretical discussions regarding the nature of design originate from design as a practice. Henry Cole attempted to create a setting for discussions on what design is and might be, with the publication of The Journal of Design and Manufacture in the 1850s (Margolin, 2000). However, “the articles, similar to other design writing at the time, were opinionated and filled with moral judgments about design quality” (ibid., p. 1). As the following research suggests, this focus on design as a practice was not helpful in establishing a theoretical basis for design as a discipline.

Subsequently, design writing changed its focus. Academic design research began to emerge in the 1960s (Bayazit, 2004; Buchanan & Margolin, 1995; Margolin, 2000) yet by the 1980s neither the scope nor the vocabulary of the young discipline had reached stability (Archer, 1981). The importance of defining design in order to prove its credibility within academia was high, for example:

Those of us who believe that design is a discipline have a major task to perform before acceptance can be expected in academia, in the world of practice, and amongst top managers and government policy makers. The task is to define the phenomenon about which the discipline is concerned (Nadler, 1980, p. 299)
Defining the artistic, technological or scientific origins of design drove academic debates. One of the first to lay claims on the origins was Walter Gropius, who initiated the first modern design school, called The Bauhaus, in Weimar, Berlin, in 1919. The Bauhaus is of major significance in design history, although current theorising on what is design leaves its once break-through methods of educating in the past (Buchanan, 2001; Heskett, 1980). However, at the time, Gropius desired a holistic education and aimed to create “the complete building,” which in his view was “the ultimate aim of the visual arts” (Fry, 1999, p. 151). To achieve this he employed avant-garde artists, such as Paul Klee, Wassily Kandinsky, Lázló Moholy-Nagy and Josef Albers to teach the students. At the time, having artists teaching design created well-rounded designers who were enormously influential on twentieth century design (S. Walker, 2006b).

Gropius’ innovative approach to design education focused on art and technology as a foundation. The origin of design is significant as the subject differs whether it is art-based or technology-based. The importance placed on these two fields, and a third field, science, has created different methodological approaches to design education throughout history (Findeli, 2001). Figure 2.8 shows these differences over time and place.

![Figure 2.8. Historical approaches to Design Curriculum (Findeli, 2001, p. 8)](image-url)

The diagram for the original Bauhaus showed a bias towards art and technology, the New Bauhaus moved towards art and science, then Ulm School of Design (Hochschule für Gestaltung) prioritised science and technology over art. At a similar time, in 1968, Herbert Simon (1968; 1996) was writing about his desires to scientise design. He asserted “everyone designs who devises course of action aimed at changing existing situations into preferred ones” adding “[d]esign, so construed, is the core of all professional training; it is the principal mark that distinguishes the professions from the sciences” (Simon, 1996, p. 111).
However, he concluded in favour of de-emphasising the skill of design in favour of an emphasis on science (1996).

Simon’s claims that design is a science were later matched by the notion that design is not a science but a third area of education, and equal to both the disciplines of science and the humanities. Discussions aimed at understanding Design as a Discipline were published in the inaugural issue of the journal, Design Studies, in a specific three-part series. The Professor of Design Research in London’s Royal College of Art, Bruce Archer, contributed two articles to launch the discourse. In the first, Whatever became of Design Methodology?, he argued for the existence of “a designerly way of thinking and communicating” (Archer, 1979c, p. 17). In the second, (both were published in the same first edition) he asserted, The Three Rs, of “reading, writing and ‘rithmatic [sic]” only included two areas of education: language and number. Archer suggested the third area in education could be design (1979b, p. 18), justifying his conclusion by reasoning the three areas of human knowledge are based around humanities, science and design, as in Figure 2.9.

Figure 2.9. Relationships between three areas of human knowledge (Archer, 1979b, p. 20).

In the following year, Gerald Nadler (1980) continued the discussion. He questioned:

Physical sciences have their generalizations about natural objects, sociology about the nature of groups, economics about the characteristics of exchange of goods and services, medicine about the care of the physical human, and so forth. But what is the phenomenon of design about? (ibid., p. 299)

It was as a result of attempting to identify how design can be the third area of education that Nadler proposed his theory of planning and design. Nigel Cross closed the series on Design as a Discipline and concluded that design, just like the fields of science or humanities, needs more research (1982). He recommended understanding notions of “designerly ways of knowing”, “the scope, limits and nature of innate cognitive abilities relevant to design” and “the ways of enhancing and developing these abilities through education” (ibid., p. 226). In this way, the journal launched the debate on the origins of design in order to justify why and how design is an academic discipline, as opposed to a
specialised subject, that is equal to its counterparts within science or humanities. Such debates are still prevalent today.

The department or faculty that the discipline of design resides in within institutions is important in terms of the validation of design research (Melles & Kuys, 2010). Researchers still argue “design has not (yet?) reached the status of science, art, technology, and economics” (Jonas, 2001, p. 65) [brackets in original]. This is because:

Design is *not art* because it does not aim at individual expression, but instead to serve various stakeholders, even though there are all of those intuitive, creative, and individual components. Design is *not technology* because it deals with fuzzy, discursive criteria rather than objective criteria, even though design shares many functional objectives. Design is *not science* because it does not offer new explanatory models of reality, but changes reality more or less purposefully, and yet the experimental process of research resembles the design process. Obviously, design is something very special (Jonas, 2001, pp 65-66) [emphasis in original].

Despite ‘design being something very special’, actual definitions of what it is remain elusive. Table 2.1 shows a range of further definitions given over the past fifty years by prominent design theorists, practitioners and educators.

Table 2.1.

*Designers, Design Theorists and Design Educators Define Design over the Decades*

<table>
<thead>
<tr>
<th>Designer</th>
<th>Decade</th>
<th>Definition of design</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christopher Alexander</td>
<td>1960s</td>
<td>“...the process of design; the process of inventing physical things which display new physical order, organization, form in response to function.”</td>
<td>(Alexander, 1964, p. 1)</td>
</tr>
<tr>
<td>Charles Eames</td>
<td>1960s</td>
<td>“Design is a plan for arranging elements in such a way as to best accomplish a particular purpose.”</td>
<td>(Neuhart, Neuhart, &amp; Eames, 1989, p. 14)</td>
</tr>
<tr>
<td>Buckminster Fuller</td>
<td>1960s</td>
<td>“The opposite of design is chaos.”</td>
<td>(Allinson, 1997, p. 21)</td>
</tr>
<tr>
<td>Herbert Simon</td>
<td>1970s</td>
<td>“Design is changing existing situations into preferred ones.”</td>
<td>(Simon, 1996, p. 111)</td>
</tr>
<tr>
<td>Bruce Archer</td>
<td>1970s</td>
<td>“Design is ‘the conception and realization of new things’. It encompasses the appreciation of ‘the material culture’ and the application of ‘the arts of planning, inventing, making and doing’.”</td>
<td>(Cross, 1982, p. 221)</td>
</tr>
<tr>
<td>Victor Papanek</td>
<td></td>
<td>“Design is the conscious effort to impose meaningful order.”</td>
<td>(Papanek, 1971, p. 17)</td>
</tr>
</tbody>
</table>
In the 1960s Alexander indicated design is a way of ordering, which is a notion that is common throughout the decades. For instance, Fullers’ “the opposite of design is chaos,” Papanek’s “impose meaningful order,” Krippendorff’s “making sense,” and Margolin’s “conception and planning of the artificial.” Overall, and given the depth of social understandings of the word reviewed in the previous section, it is generally accepted that the word ‘design’ is an ambiguous one (Buchanan & Margolin, 1995; Fry, 1999; Micklethwaite, 2003). Questions may arise as to which definition is understood and utilised throughout the remainder of the thesis. These definitions demonstrate the complexity and variety inherent with design and as a result underpinning this work is the contention that there are many different ways of understanding design, not only as a layperson but also from a research perspective. Thus, when I refer to design, I mean to encapsulate many of these broad meanings.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Summary</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>Klaus Krippendorff</td>
<td>1980s</td>
<td>“Design is making sense of ‘things’.”</td>
<td>(Krippendorff, 1989, p. 9)</td>
</tr>
<tr>
<td>John Walker</td>
<td>1980s</td>
<td>“Design can refer to a process (the act or practice of designing); or to the result of that process (a design, sketch, plan or model); or to the product manufactured with the aid of a design (designed goods); or to the look or overall pattern of a product (‘I like the design of that dress’).”</td>
<td>(J. A. Walker, 1989, p. 23)</td>
</tr>
<tr>
<td>John Christopher Jones</td>
<td>1990s</td>
<td>“The initiation of change in man-made things.”</td>
<td>(Jones, 1992, p. 6)</td>
</tr>
<tr>
<td>Richard Buchanan</td>
<td>2000s</td>
<td>“Design is the human power of conceiving, planning, and making products that serve human beings in the accomplishment of their individual and collective purposes.”</td>
<td>(Buchanan, 2001, p. 9)</td>
</tr>
<tr>
<td>Ken Friedman</td>
<td></td>
<td>“The goal of design is solving problems, meeting needs, improving situations, or creating something new or useful.”</td>
<td>(Friedman, 2003, p. 508)</td>
</tr>
<tr>
<td>John Heskett</td>
<td>2000s</td>
<td>“Design means the human capacity to shape and make our environment in ways without precedent in nature that serves our needs and gives meaning to our lives.”</td>
<td>(Heskett, 2002, p. 10).</td>
</tr>
<tr>
<td>Terence Love</td>
<td></td>
<td>“‘Design’ - a noun referring to a specification for making a particular artefact or for undertaking a particular activity. A distinction is drawn here between a design and an artefact - the design is the basis for and precursor to the making of the artefact. In this sense, this distinguishes the outcomes of designing from the outputs of craft or art alone.”</td>
<td>(Love, 2000a, p. 250)</td>
</tr>
<tr>
<td>Victor Margolin</td>
<td></td>
<td>“Design can be conception and planning of the artificial.”</td>
<td>(Margolin, 2002, p. 106)</td>
</tr>
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</table>
The Process of Design

At the beginning of the chapter I described not only how the profession of design has been shaped over time but also how the different design professions shape specific outcomes. This highlighted the range of different approaches to design, such as the use of innovation and user-centred thinking. Both design as a profession and design as an academic discipline (research and education) share an underlying commonality, which is design is a way of ordering. That is to say, the process of design plays an essential role in both theory and practice. In the critique of different design processes that follow, I conclude that tame problems can be solved with linear design processes, but ‘wicked problems’ necessities complex design processes that essentially redefine the design problem in order to incorporate humanistic, reflective, and integrated approaches.

The design process is a complex and individual exercise. Designers are responsible for creating something that does not yet exist (P. Lloyd & Bushby, 2010). They do so through a process that is highly disputed yet inherently personal (Lawson, 2005). Moreover:

Rather than indicating a course of action that is specific for the accomplishment of a task, design is a vague, ambiguous, and indefinite process of genesis, emergence, or formation of something to be executed, but whose starting point, origin, or process often are uncertain. Design provides the spark of an idea and the formation of a mental image. It is about the primordial stage of capturing, conceiving, and outlining the main features of a plan and, as such, it always precedes the planning stage (Terzidis, 2007, p. 69).

Doubtless, individual approaches to design do not necessarily testify to the strength of the designed outcome but rather to the fact that the design process is highly flexible. Communicating what a design process involves, therefore, is a complicated matter. In 1969, five designers were asked to participate in an exhibition titled, "Qu’est-ce que le <design>?" (What is design?), for the Museum of Decorative Arts in France (Neuhart et al., 1989). The famous and prolific American product designer, Charles Eames drew his version of the design process, which is arguably one of the most well known diagrams within design research (Dubberly, 2010). Figure 2.10 shows Dubberly’s digital version (ibid., p. 76) of the original hand-drawn illustration (Neuhart et al., 1989, p. 13).
Figure 2.10. Charles Eames’ digital version of the Design Process (Dubberly, 2010, p. 76)

Despite its title, the diagram does not describe a design process; rather it describes where designers can work with conviction and enthusiasm (Dubberly, 2010). Eames, himself notes:

...none of these areas is static. As client and designer get to know each other, they influence each other. As society’s need become more apparent, both client and designer expand their own personal concerns to meet these needs (Neuhart et al., 1989, p. 14).

Eames’ diagram succinctly demonstrates the fluidity of working with clients in the practice of design. In doing so, he illustrates his unique process of thinking.

Other depictions of the process of designing are a linear progression of sequential events in order to develop a product, as opposed to Eames’ approach of working with clients. The first phase is to research what is required, in order to facilitate an understanding of:

...why something is needed – who will use it, where, and to what end; which then might help define what is designed – the structure and features that make it meaningful; and lastly the definition of what’s needed might help drive how the artifact [sic] looks and even how it’s made (Dubberly, 2010, p. 76).

After the research phase follows iterative cycles of making and testing, then refining and evaluating (Dewberry, 1996; Dillon & Howe, 2003; Ulrich & Eppinger, 2000). One typical and relatively simple design process model is illustrated in Figure 2.11.
Figure 2.11. The product development process (Ulrich & Eppinger, 2000, p. 9).

The diagram shows sequential events commencing with planning and concept development and leading towards testing and refinement, and production ramp-up. Once a concept is decided upon, the system-level and detailed design process begins; this process cycles through until testing and analysis provides satisfactory solutions. The final stage is achieved when the designed outcome is ready for production and then market release. This linear model illustrates how a problem is given to the designer, a “rational decision making process” takes place and then the solution is “thrown over the wall” (Jonas, 2001, p. 75).

Such linear design processes reflect some simple, cause-and-effect-type design problems (Buchanan, 1992; Conklin, 2006; Rittel & Webber, 1973; Wahl & Baxter, 2008). A simple problem-solving process is illustrated in Figure 2.12, the waterfall-type model.

Figure 2.12. Pattern of cognitive activity of one designer – the “waterfall” line (Conklin, 2006, p. 4)

The diagram above shows a similar process to Figure 2.11, where to move from problem to solution, a designer must gather and analyse data (customer requirements, planning and conceptual design), and then formulate and implement a solution over a period of time (system-level and detailed design). As a problem increases in complexity, so too does the strength of the advice from some design theorists that is essential to follow such an orderly flow (Conklin, 2006; Ulrich & Eppinger, 2000). However, research shows that these simplistic models do not reflect the actual nature of designing (Conklin, 2006; Findeli, 2001; Heape, 2007; Jonas, 2001).
Not all types of design problems are similar; some can be described as ‘tame’ and others as ‘wicked’. Tame problems are solvable and follow orderly flows, thus producing workable solutions within acceptable time frame (Conklin, 2006; Rittel & Webber, 1973). However, more complex problems often require a different type of process. In 1973, Horst Rittel and Melvin Webber (p. 155) coined the term “wicked problems” to distinguish from tamer problems. Jeff Conklin (2006) built on Rittel and Webber’s planning and policy uses of ‘wicked problems’; he illustrated a clear and literal representation of the complexity of design processes. He conducted a study in the 1980s to reveal how designers cognitively tackle complex problems. Conklin explained:

A number of designers participated in an experiment in which the exercise was to design an elevator control system for an office building. All of the participants in the study were experienced and expert integrated circuit designers, but they had never worked on elevator systems before. Indeed, their only experience with elevator systems came from riding in elevators. Each participant was asked to think out loud while they worked on the problem. The sessions were videotaped and analyzed [sic] in great detail (ibid., p. 4).

Figure 2.13 illustrates the results of these expert system designers being asked to design a complex, unfamiliar item. Their natural pattern of problem solving is far from the waterfall linear process described above. It appears disorderly on the surface but “it reflects a deeper order in the cognitive process” (ibid., p. 6).

The diagram shows the ‘jagged’ cognitive patterns of designers, which appear to be sporadic and unorganised. However, Conklin asserts that this “non-linear process is not a defect, but rather the mark of an intelligent and creative learning process” (2006, p. 6). ‘Wicked problems’ is an appropriate description for the complex problems that create the jagged line in designers’ cognitive activity (Buchanan, 1992; Conklin, 2006). Julie Klein summaries these types of complex problems:
Arising from environments characterized by turbulence and uncertainty, complex problems are typically value-laden, open-ended, multidimensional, ambiguous, and unstable. Labelled ‘wicked’ and ‘messy’, they resist being tamed, bounded, or managed by classical problem-solving approaches (Klein, 2004, p. 4).

These descriptions suitably characterise real world problems that designers face compared to the tame problems that can be answered following the straightforward, linear design process (Buchanan, 1992; Conklin, 2006; Klein, 2004; Rittel & Webber, 1973; Wahl & Baxter, 2008). A comparison between tame problems and these types of distinctly more complex problems are shown in Table 2.2.

<table>
<thead>
<tr>
<th>Characteristics of Tame Problems:</th>
<th>Characteristics of ‘Wicked Problems’:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. has a well-defined and stable problem statement</td>
<td>1. you don’t understand the problem until you have developed a solution</td>
</tr>
<tr>
<td>2. has a definite stopping point, i.e. when the solution is reached</td>
<td>2. has no stopping rule</td>
</tr>
<tr>
<td>3. has a solution which can be objectively evaluated as right or wrong</td>
<td>3. has solutions that are not right or wrong</td>
</tr>
<tr>
<td>4. belongs to a class of similar problems which are all solved in the same similar way</td>
<td>4. every problem is essentially unique and novel</td>
</tr>
<tr>
<td>5. has solutions which can be easily tried and abandoned</td>
<td>5. has solutions that can only be a one-shot operation</td>
</tr>
<tr>
<td>6. comes with a limited set of alternative solutions</td>
<td>6. has no given alternative solutions</td>
</tr>
</tbody>
</table>

Recognising ‘wicked problems’ can be a challenge for some designers. “Most projects today have a significant wicked component. Wicked problems are so commonplace that the chaos and futility that usually accompany them are accepted as inevitable” (ibid., p. 3). One of the major issues for designers addressing these types of complexities found within problems is the failure to recognise them and the subsequent persistence in addressing them, and as a result using tools perfected for tame problems (Buchanan, 1992; Conklin, 2006), such as the linear process championed by Ulrich and Eppinger (2000).

The approach to ‘wicked problems’ persists as a “description of the social reality of designing rather than the beginnings of a well-grounded theory of design” (Buchanan, 1992, p. 16). To begin the task of grounding design theory in its social reality we need to redefine how designers approach design “it becomes a design problem to define the design problem” (Jonas, 2001, p. 75). Jonas illustrates a possible solution in Figure 2.14, explaining that it is the “broadened concept of the design process covering such requirements as universality, future-orientation, reducing contingency, and providing feedback” (ibid.).
Figure 2.14. Broadened concept of design (designing) (Jonas, 2001, p. 75)

The diagram shows the connections between each process of design. Reflecting on each process is key to designing the design problem. The analysis phase asks how to conceive of and model the problem, the projection phase asks how people want to live and investigates possible future scenarios, and the synthesis phase asks what people might need to do to achieve that (ibid.). All of these phases are iterative and provide feedback and learning for the designer.

Undoubtedly, when defining the problem becomes problematic, rethinking how designers understand design becomes necessary. For example, Buchanan claimed:

To understand the changing meaning of ‘product’ in design and the consequent problems and issues of design practice, design education, and design research, I have suggested that there are four orders of design in the twentieth century (Buchanan, 2001, p. 10).

In his four orders of design, Buchanan argued that communication design has grown out of a “concern for visual symbols, the communication of information in words and images,” and product design “grew out of a concern for tangible, physical artifacts [sic] – for material things” (ibid.) [emphasis added]. He continued:

The process of ordering, disordering, and reordering design is revolutionary, and I believe we are now in the midst of such a revolution. Instead of focusing on symbols and things, designers have turned to two quite different places to create new products and to reflect on the value of design in our lives. They have turned to action and environment. The argument for the reordering of design is simple and clear. It is certainly important that designers know how to create visual symbols for communication and how to construct physical artifacts [sic], but unless these become part of the living experience of human beings, sustaining them in the performance of their own actions and experiences, visual symbols and things have no value or significant meaning (Buchanan, 2001, p. 11) [emphasis in original].

These four orders of design, from symbols and things to action and environment is a clear shift in understanding of what is important for design and designers. With this in mind, defining ‘wicked problems’ of design adjust to focus more on human interactions and experience, which is distinctly different to traditional linear processes.
Other influential thinkers of the twentieth century offered new ways of considering the design process. Donald Schön’s “reflection-in-action” model (1995, p. 128) has had a major influence in the design field (Findeli, 2001, p. 10). Schön discussed five elements: knowing-in-action, reflection-in-action, conversation with the situation, reflecting on the situation, and reflective conversation with the situation (Schön, 1995). He summarises these five elements as interacting in a hands-on design situation. Alain Findeli’s interpretation of Schön’s direction on design comprises of:

A new logical structure of the design process is:
1. Instead of a problem, we have: state A of a system;
2. Instead of a solution, we have: state B of the system; and
3. The designer and the user are part of the system (stakeholders)

The designer’s task is to understand the dynamic morphology of the system, its ‘intelligence.’ One cannot act upon a system, only within a system... (Findeli, 2001, p. 10) [brackets and emphasis in original].

The significance of the reflection-in-action model can be described as designers have being deeply involved in the design problem in order to attempt to find solutions. This type of humanistic and interconnected thinking is beneficial to solving ‘wicked problems’ in design.

In summary, tame problems can be solved with linear design processes but ‘wicked problems’ mean a new type of thinking is required. Each of the different models from Conklin, Jonas, Buchanan, Schön and Findeli suggest different ways of thinking about the process of design. Each model proposes that a linear design process is not adequate for the complexity of problems found in design today, so each advances design thinking in contemporary ways. As such ‘wicked problems’ require a redefining of the design problem, and the incorporation of humanistic, reflective and integrated approaches. These conceptions of design are considerably different to more societal conception of activities, environments, information, objects, policies, services, and systems identified at the beginning of the chapter. The following subsection explores how all these differences can be brought together in design education.

The Teaching of Design

At the beginning of this chapter I introduced a number of specialist domains within the profession of design. As a result of design education courses being dedicated to these subsidiary professions, the teaching of designers has grown in a somewhat “adhoc manner” (Love, 2000a, p. 249). Each distinct domain has significant elements that take precedent over others, yet each can lack deeper conceptions of education, theory and research (ibid.). So, “[w]e can no longer afford to immerse the student of architecture or product design in a few traditional crafts. Rather they must learn to appreciate and exploit new technology as it develops” (Lawson, 2005, p. 6). In this way, contemporary design thinking and research
strives to pull the subsidiary fields back together in the hope that it will create a stronger, broader discipline (Buchanan, 1990).

These differences in opinion regarding the nature of design, the process of design and the profession of design determine how it is practiced and taught. As previously indicated, design as a discipline is in a permanent state of transition (B. Jackson, 2000; Niederhelman, 2001), possibly due to the blurring of the boundaries between design as a practice and design as a theory-based discipline (Dilnot, 1982, 1984b). This practical grounding coupled with the complexity of the internal structures of an established theoretical university system (Owen, 1998) occasionally led to conflict or confusion for design educators between practice-led or research/theory led teaching (Love, 2000a; Margolin, 2000; Ulrich & Eppinger, 2000). Thus, a key question has been “whether design should be taught primarily by establishing a foundation of theory or by engaging students in loosely supervised practice” (Ulrich & Eppinger, 2000, p. ix). In addressing this question, I propose that both are essential elements with design education.

The theory-led approach to the teaching of design focuses on design in research (for example, the rudiments of design or differences in design process), the promotion of which can be found in a variety of scholarly journals and societies. That is to say, design research is “a dominant topic at design conferences” (Margolin, 2000, p. 1). Practice-led teaching focuses on the pragmatic hands-on approach, often associated with some of the societal conceptions of design described in the previous section of this chapter. Both theory-led and practice-led approaches are necessary to design and drive debates regarding what doctoral research in the discipline of design might look like (Durling, 2002; Margolin, 2000). The latter encompasses a practical component to the degree, and the former, which is similar to my approach, focuses on establishing a theoretical framework through which to address the research problem (a notion further explored in the following chapter).

Practice-led teaching at tertiary level incorporates skill-specific techniques, as well as a comprehension of the vast scope of physical materials available and an appreciation of the range of simple or elaborate manufacturing processes (Lesko, 1999; Ulrich & Eppinger, 2000). It includes the intricacies of human factors, from ergonomics and anthropometrics, to biomechanics and the interaction between user and product, where terms such as cognitive ergonomics or user-centred design have become popular (Lidwell, Holden, & Butler, 2003; Pheasent, 1996; Wickens, Gordon, & Liu, 1998). Figure 2.15 illustrates some of the different components associated with designing a product (in this case a car) and demonstrates different facets needed to be communicated to design students (Dewberry, 2005, p. 7).
This type of practical design education is not limited to universities. Preceding its status as an academic discipline, design was a vocational option within colleges aimed at training for business (Cross, 1982; Love, 2000b; Micklethwaite, 2003). This pragmatic approach focused design education on the practical skills required in business, particularly professional competency with visual representation (Love, 2000b; Powell, 1994; Ulrich & Eppinger, 2000). Design is also a pragmatic, empirical enquiry into research problems, some of which are not taught within a university setting, and graduates continue to learn through working with professional designers and design teams (Ulrich & Eppinger, 2000).

Over the years the focus of design education has moved towards a more humanistic emphasis. Attention was originally centred on “an external perspective” of “the form, function, materials, and manner of production and use of products” (Buchanan, 2001, p. 13), such as those described above. However, this reasoning led to the prominence of “materials, tools, and techniques” in initial design education, such as in the “preliminary” or “foundation” courses offered at the Bauhaus and the New Bauhaus (ibid.). Buchanan continued:

With the move away from visual symbols and things as the focus of attention, designers and design theorists have tried to understand products from the inside—not physically inside, but inside the experience of the human beings that make and use them in situated social and cultural environments. While form, function, materials and manner of production continue to be significant, we have an opportunity for new understanding through an investigation of what makes a product useful, usable, and desirable (ibid.).

Thus, the human experience of design, highlighted in the previous section, is of primary importance and connects the student designer to specific situations.
Design education is unusual when compared to other disciplines because of a sense of camaraderie, learning from peers, and of wisdom handed down from a master. Where:

…project-based education and studio-based education have been central features of design education from early in the twentieth century, if not earlier. This means that the core principles of the discipline are taught through practice, and are presented as part of a solution for a specific problem. For this reason, the learning from one project may not survive in the transition to other projects and problems. While the principles embody an element of theory, they are not presented as theory, but as rules-of-thumb and the slowly acquired wisdom of teachers and masters (Breslin & Buchanan, 2008, p. 39).

The education of student designers often, therefore, incorporates a different approach to other disciplines, an approach appropriate for transitioning complex skills and thinking. This approach is arguably derived from the former ‘atelier’ style of working where “apprentices followed the master in observing, exercising, and dealing with real design projects” (J. Chen & Heylighen, 2006, p. 580).

It is rare that teachers stand in front of students and just lecture. Most of a design student’s education experience occurs in the design studio, where students learn from tutors and from each other (Koch, Schwennsen, Dutton, & Smith, 2002). This can provide an exhilarating place to work in which many experiences are gained that are not directly written into the educational plan (Koch et al., 2002). Similarly, Ian Grout asserts that “an experimental project based approach to design education” is necessary because of an increase in students’ awareness of ecological issues relating to design (2006, p. 78). He continues:

This approach will need to be one in which we will discover the appropriate balance between practice and theory. This approach, I believe, will be the best able to be flexible and continuously ongoing in our quest to bring a wide ranging view of quality of life including wellbeing, health and happiness to designing ethically (ibid.).

So, combining theory and practice through experimental and experiential projects can provide holistic education to design students. That is to say, distinguishing between theory-led and practice-led education is somewhat unnecessary, as the boundaries between the two can be somewhat blurry (Dilnot, 1982). Moreover, experiences of projects with a combination of both theory and practice can create a productive vibe that any successful business will try to emulate (Koch et al., 2002).

In summary, the focus of design education has changed over recent years. The different experiences provided by practice-based learning and theory-based learning are both equally necessary in the education of future design graduates, to provide adequate skills and also equip them with ways of thinking and reflecting upon the design problem, the design process and how to create useful, useable, and desirable outcomes. Furthermore, research shows that learning does not diminish upon graduation, but thrives within design as a profession, which blurs the boundaries between theory and practice. Thus leading into
the following section that critiques research and practice of designers in the specific field of design and sustainability.

**The Breadth of Sustainable Design**

In the previous chapter, I discussed how current patterns of production and consumption are unsustainable. I also suggested that much of what is “unsustainable arrives by design” (Fry, 2000, p. 6). Similar propositions are indicated by other prominent researchers in the field of sustainable design: Victor Margolin (1998, p. 83), AnneMarie Willis (1999, p. 9), Kate Fletcher and Emma Dewberry (2002, p. 38), Bill Moggridge (2006, p. 656), Nathan Stegall (2006, p. 56), and Stuart Walker (2006, p. 8). These individuals, amongst many others, are interested in how designers have a distinct role to play in the creation of more sustainable futures. A wide variety of approaches by which to address this problem are in practice. This third section, therefore, concerns the growth of sustainable design and changing patterns of production and consumption.

**A Brief History of Sustainable Design Research**

The notion of social responsibility within design can be traced back as far as the Arts and Crafts Movement. At the turn of the twentieth century influential designers, such as William Morris and John Ruskin, resisted the growth of industrialisation (Dewberry, 1996; Fletcher & Goggin, 2001). In the 1920s, Buckminster Fuller carried the environmental baton (Fletcher & Goggin, 2001; Margolin, 1998), and in the 1950s Henry Dreyfus was concerned to design for people (Dreyfuss, 1955). Fuller, in the early 1960s, while working as Professor at Southern Illinois University, participated in a *World Design Science Decade* (Margolin, 1998, p. 85). This programme’s goals encompass a “[r]eview and analysis of world energy resources,” “[d]efining more efficient uses of natural resources such as metal,” and “[i]ntegrating machine tools into efficient systems of industrial production” (ibid.). Similar aims have since been reflected in many international policies, reports and protocols that are not necessarily design specific, but are nevertheless significant for designers, such as the *Brundtland Report* (World Commission on Environment and Development, 1987), *Agenda 21* (United Nations, 1992) and the *Kyoto Protocol* (United Nations, 1998).

Some groups of designers have reacted against the affluent consumer culture propelled by their industries and have created their own design-specific policies. One example comprised of twenty-two graphic designers frustrated with advertising design in the sixties. At an event hosted by the Institute of Contemporary Arts, the group proclaimed a manifesto entitled, *First Things First: A Design Manifesto*, aimed at finding a humanistic dimension to graphic design theory (Garland et al., 1964). The manifesto claims:

...those who have flogged their skill and imagination to sell such things as: cat food, stomach powders, detergent, hair restorer, striped toothpaste, aftershave lotion, before shave lotion, slimming diets, fattening diets, deodorants, fizzy water,
cigarettes, roll-ons, pull-ons and slip-ons. By far the greatest effort of those working in the advertising industry are wasted on these trivial purposes, which contribute little or nothing to our national prosperity (ibid., p. 1).

This list of everyday items emphasises the frustration that some designers feel with their industry and their peers. But nothing compares to Victor Papanek’s (1985) harsh castigation of industrial design and the advertising design industry. He declared that most design values lack ethical values, stating:

There are professions more harmful than industrial design but only a few of them. And possibly only one profession is phonier. Advertising design, in persuading people to buy things they don’t need, with money they don’t have, in order to impress others who don’t care, is probably the phoniest existence today. Industrial design by concocting the tawdry idiocies today, hawked by advertisers comes a close second (Papanek, 1985, p. xxi).

Papanek’s admonishment of design inspired many students and practicing designers, “who were looking for some alternative to designing more products for the consumer culture” (Margolin, 1998, p. 83). In the 1970s, Gui Bonsiepe, Tomàs Maldonado and John Christopher Jones took up the baton and reiterated Papanek’s themes within design schools and conferences, though they failed to sustain student motivation (Margolin, 1998, p. 85). This lack of engagement was frustrating for some designers and researchers, prompting more attacks on consumerism. In the 1990s, for example, Nigel Whiteley (1993) condemned the ethos of valuing form over function and designing for fashionable, transient trends. Evidently, some graphic and product designers have felt the weight of their professions on their conscience since the beginning of last century, but finding effective ways to deal with the unsustainability of production and consumption has been arduous. In this way, supporting Hopkins’ & McKeown’s (2002) suggestion that it is easier to describe what is unsustainable in the world, and far more complex and challenging to identify what is sustainable.

Thus, addressing sustainability within design poses challenging problems that some designers are not yet prepared to face. It is not uncommon for academics, researchers, practitioners and educators to simply reject any attempt to address sustainability (Fletcher & Goggin, 2001). A widespread claim is that “issues of scale, ease of implementation, potential environmental benefits, and the focus of design activity” renders sustainability too complex to implement (ibid., p. 16).

In Chapter one I suggested how a nested or concentric circle model (Figure 1.5) is a more appropriate way of understanding sustainability today, as opposed to the overlapping circles of the Venn diagram (Figure 1.3). The former represents the complex interrelationship between economy, environment and society, whilst the latter is segmented. However, other researchers refer to the latter approach of sustainability positively, for instance, Triple Bottom Line accounting focuses on each separately (Elkington, 2005). Some researchers assert that it is not feasible to address environmental and economical problems together, alternatively, addressing them exclusively means clear financial gains can be
identified (Argument et al., 1998). Yet others argue how this overlapping model of sustainability, adopted by some businesses meant that the promotion of environment and social issues were just bolted-on to standard balance sheets, which result in a reduction of the traditional measure of profit (Shedroff, 2009).

New approaches to understanding and implementing sustainability are needed. The “integrated bottom line” is a more self-explanatory approach for designers where the disconnection between each of the circles can be overcome (Shedroff, 2009, p. 63). Arguably an overhaul on current understandings will require a change in the current economic model (Dewberry, 1996). Whether or not designers can influence fundamental global economic models is debatable, but designers do have a crucial role in enabling sustainable solutions (Chapman & Gant, 2007a; Charter & Tischner, 2001; Cipolla, 2006; Clune, 2009; Cooper & Evans, 2000; Datschefski, 2001; Dewberry & Monteiro De Barros, 2009; Feijs & Meinel, 2005; Lilley, 2009; Lockton & Harrison, 2009; Manzini & Vezzoli, 2002; Marchand & Walker, 2008; Margolin, 1998; Melles, de Vere, Bisset Johnson, & Strachan, 2010; Shedroff, 2009; Sherwin, 2004; P. Thompson & Sherwin, 2001; Thorpe, 2010; Wahl & Baxter, 2008; S. Walker, 2006b).

With this in mind, the following subsections aim to counter some of the defuturing conditions of unsustainability raised in the first chapter. As such, each unsustainable pattern is re-addressed and relevant sustainability research is introduced and critiqued, specifically in relation to a designers’ role in production, consumption and waste.

### Changing Patterns of Production Through Incremental Change

In the previous chapter I introduced the notion that unsustainable patterns of production are persisting through mass destruction of mining for resources, energy intensive processing plants and subsequently the growth of unwanted materials accumulated in electronic waste and accruing in landfills and waterways. In this subsection, and the next, I address these issues by critiquing literature relating to changing patterns of production. I focus on the potential for changing these patterns incrementally, in doing so implementing more energy efficient and less harmful materials and production methodologies. I support the proposition that these type of approaches can create awareness of unsustainability, but incremental changes alone are neither enough to sustain long-term change nor to create a more sustainable future. Thus leading into the following subsection, where more holistic approaches to the problem are reviewed.

In order to develop sustainably a decrease in resource and energy use is advised, and a substantial increase in efficiency is the target. An emergent campaign of the 1990s relevant to achieving such targets was the factor X lessening of resource use, where X could be set between four and fifty (Reijnders, 1998; von Weizsäcker, Lovins, & Lovins, 1998). The factor X concept not only provided “a tool for measuring human demand on bioprodutivity,” but also “offer[ed] a tool for measuring the potential effect of remedial policies” (Wackernagel et
al., 2002, p. 9269). Thus, cleaner technologies, renewable energy, and mimicking of biological process can all aid in the reduction of resources by a factor four while maintaining the same level of service, in particular for transportation and within households (von Weizsäcker et al., 1998). Despite the calculations the action is commonly referred to as “factor ‘x’ as no one really knows the magnitude of the change required” (Charter & Tischner, 2001, p. 123).

Such understandings influence designers, some of whom are driving a change in shaping production patterns. As previously described, designers create objects that do not yet exist, in the process they have the ability to “synthesize and resolve often-contradictory needs” to “create solutions that meet the needs of users and society that achieve business goals and help improve environmental performance” (White et al., 2005, p. 7). The thinking, experiences, and directions of some designers are based on product-focused solutions that “attempt to influence environmental impact by making existing products more efficient” (Fletcher & Goggin, 2001, p. 17). Eighty percent of the environmental and social impacts of some products are locked in at the design development stage (Dewberry & Sherwin, 2002; Lewis, Gertsakis, Morelli, & Grant, 2001; Tischner, 2001; White et al., 2005), for others, environmental impacts of occur within any stage of a product’s life-cycle (White et al., 2005).

Research shows that the cradle-to-grave linear process associated with designing products is no longer sustainable. The linear process is described as “manufacture – service – disposal” (Ulrich & Eppinger, 2000, p. 257). Others assert there are “four stages of existence: introduction, growth, maturity and decline” (Lidwell et al., 2003, p. 126). Similarly, the majority of linear models progress sequentially in this cradle-to-grave type process (Madge, 1997; Ness, Urbel-Piirsalu, Anderberg, & Olsson, 2007; Stegall, 2006).

William McDonough and Michael Braungart (2002) argue, in their book of the same title, that a Cradle to Cradle cycle must be adopted instead. They suggest that to integrate products fully in such a cradle-to-cradle approach, the object is broken down into materials that are biological nutrients or technological nutrients. The former becomes food for another, and the latter stays within closed-loop cycles (ibid.). Figure 2.16 shows two different life-cycle depictions.
The diagrams in Figure 2.16 show a theoretical life-cycle (left) and one placed within the context of car production (right). For both of these illustrations when the product arrives at the end-of-life there is no option for disposal, rather materials are reallocated and products are reused. However, implementing this system of change can be incremental, which can mean the shift to this way of thinking is slow, limiting, and can omit important considerations of people affected throughout the process (Fletcher & Goggin, 2001; Ramirez, 2007; Stegall, 2006; Whiteley, 1993).

Life-cycle thinking as an approach to unsustainability is important, yet if these types of strategies focus solely on eco-efficiency, then life-cycle thinking can be restrictive. Strategies for addressing specifically environmental issues are typically synonymous with incremental change; for example, they focus on recycling strategies, or minimising material use. Such strategies comprise of pragmatic decisions intended to improve the environmental impact of material selection, the product processes, distribution and packaging, product use, and end-of-life (as opposed to disposal) (Kurk & McNamara, 2006; Lewis, et al., 2001). In addressing the choice of materials in such a framework the questions to be considered include whether the product is designed to:

- be made from recycled, recyclable or compostable materials?
- avoid or minimize the use of restricted or hazardous materials contained in the product?
- minimize the number and types of materials contained in the product?
- If plastics are used, are they clearly marked by an identification system such as ISO 11469? (Kurk & McNamarà, 2006, p. 4).
Within the production of a product, minimisation of the number and complexity of manufacturing processes must be considered. Efforts to improve “product use” involve considerations such as whether the product can be “disassembled for upgrade, repair or reuse,” and whether it avoids disposable components (Kurk & McNamara, 2006, p. 5). Transportation and packaging considerations encompass “reducing the impact and cost of distribution,” alongside innovative packaging solutions (ibid., p. 7). Designers have a “crucial role” in the design of products to ensure they can be disassembled upon disposal and returned (Crul & Diehl, 2009; Kurk & McNamara, 2006; White et al., 2005), thus completing their life-cycle.

As a consequence of these ‘ecodesign’ strategies policies are now implemented to assist with the reclamation of materials and components from products. Growing in popularity is a further instrument for addressing the problem of solid waste: extended producer responsibility, it is aimed at end-of-life and that is governed through policies (Fleckinger & Glachant, 2010; Lewis et al., 2001). Here, governments allocate responsibility (whether monetary or physical) to producers for the treatment or disposal of their products at the end of the objects’ life (Fleckinger & Glachant, 2010). Examples of extended producer responsibility can be: deposit fund schemes (a refundable payment on products); advanced disposal fees (a refundable fee, paid in advance, and set to a level that covers the actual cost of disposal); voluntary agreements and covenants (for example, waste reduction strategies); and product take-back systems (collection and recovery of products) (Lewis et al., 2001). Some of these policies have already been put in place in the European Union, and others soon will be. It is expected that such programs give incentives to avert waste at the source, and to implement public recycling and materials management goals (Fleckinger & Glachant, 2010). Products targeted include: “packaging, tyres, batteries, waste oil, chlorofluorocarbons (CFCs), printed matter, electrical and electronic products, office equipment, cars, furniture, building products and agricultural plastics” (Lewis et al., 2001, p. 25).

There are a wide variety of ecodesign tools. Alastair Fuad-Luke (2002) has identified some 145 different ecodesign strategies aimed at the life-cycle of a product. One such eco-strategy corresponds to the linear design process discussed in the previous section (see Figure 2.11), and focuses on making incremental improvements. Figure 2.17 illustrates how two extra steps – environmental assessment and environmental improvement – are added to a linear process.
However, despite the addition of these extra steps, the emphasis remains on other eco-design tools that are necessary throughout the process (Pochat et al., 2007). These tools are varied and available as online tools to specialist analysts.

Ecodesign tools can be separated into two groups: assessment (or analytical) and improvement (or creative) (Lewis et al., 2001). Analytical tools are used “to gain insights into environmental impacts throughout the life-cycle of the product or service” (Lewis et al., 2001, p. 41). Examples of these can be: life-cycle impact assessment, matrix based and software based (or streamlined) life-cycle assessment, proxy indicators (including embodied energy), material input, ecological footprints and eco-indicators (ibid.). Examples of creative tools range from checklists, spider-diagrams and strategy lists (Luttropp & Lagerstedt, 2006; Tischner, Schmincke, Rubik, & Prössler, 2000), to ecodesign webs and design abacus (Capewell et al., 2007).

Both analytical and creative ecodesign tools are required between each phase of the design process (Pochat et al., 2007). It is imperative that both are used “iteratively in the search for solutions and new directions” (Lewis et al., 2001, p. 41). These tools can also be separated into qualitative or quantitative approaches and those which offer ‘general’ as opposed to ‘concrete’ prescriptions on the different environmental aspects they cover (Byggeth & Hochschorner, 2006). Each of these tools is designed to extend the product life-cycle, whether during manufacture, use or end-of-life.
Some of these tools have not been very effective; indeed some are infrequently taught or implemented. For instance, Vicky Lofthouse suggests perhaps a more fundamental reason for their ineffectiveness is that on the whole they focus on incremental change:

...ecodesign literature shows that many existing tools fail because they do not focus on design, but instead are aimed at strategic management or retrospective analysis of existing products. In addition to this it has also been recognised that they do not take into account the culture of Industrial Design and the fact that these designers have ‘their own way’ of carrying out ecodesign (Lofthouse, 2006, p. 1387).

The failure to apply these ecodesign tools has not thwarted the production of more tools and strategies (Lofthouse, 2009). These tools continue to aim to extend the life of a product by understanding its life-cycle and applying ecodesign strategies, processes and tools (Argument et al., 1998; Crul & Diehl, 2009; Kurk & McNamara, 2006; Lewis et al., 2001; Pochat et al., 2007; White et al., 2005). Such tools with which to approach issues of sustainability, however, continue to be applied and taught in a “fragmentary and scarce way worldwide” (Vezzoli & Penin, 2006, p. 78) making the pragmatic application into business an unnecessarily complicated task. There are many different elements to consider and frequently trade-offs have to be made (Byggeth & Hochschorner, 2006; Hagan, 2003), which is often due to time and expertise (Pochat et al., 2007).

These attempts at sustainability are often ‘end-of-pipe’ solutions, akin to efforts to address pollution by adding filters to the end of discharge pipes; that is, they are essentially just modifications that repair or refine existing products (Charter & Tischner, 2001; Manzini & Vezzoli, 2002; Sachs, 2003). Admittedly, adding such ‘filters’ can produce cleaner air, water, and soil but they do nothing to get to the root of the problem. Certainly, a change of factor ten cannot be achieved with strategies such as recycling alone (Charter & Tischner, 2001; McDonough & Braungart, 2002). Recycling is a “twentieth-century concept from the 1970s,” which “can no longer encompass the kind of eco-consciousness that’s needed today to solve the garbage glut that’s choking landfills” (Vienne, 2003, p. 245). McDonough and Braungart opine that dematerialisation and recycling leaves the user with a sense of a “less of everything” (2002, p. 69), which can also mean less user-friendly and has a tendency to be less durable and less appealing (Fletcher & Goggin, 2001; McDonough & Braungart, 2002). So there is the potential obstacle that eco-efficiency only focuses on reduction, which can be interpreted negatively by consumers, producers and designer alike.

Moreover, it is unrealistic to expect eco-efficient goods, which are already meeting saturated markets, to have an instantaneous and complete substitution (Fletcher & Goggin, 2001; Tischner, 2006). A further problem is encapsulated by what has been loosely termed the “rebound effect,” described as “the growth of material consumption” (Tukker et al., 2008, p. 1220). The rebound effect can be described as what happens when a product is made more eco-efficient but somehow lends itself to new opportunities for wider, faster consumption which is detrimental to society and the environment (Manzini & Jégou, 2003).
Nathan Stegall contends how this ‘effect’ undercuts the cornerstone of sustainable products because:

...the impact that any product has on the social and ecological environment depends as much on its use as on the technology it deploys. An axe, for example, can easily be made from recyclable steel, but it will still have a negative environmental impact if used to clear-cut a forest (Stegall, 2006, p. 56).

In this way, the rebound effect can “decrease or even nullify any environmental saving potential” (Jelsma & Knot, 2004, p. 120). This brings into question the efficacy of incremental or reductionist improvements in the sustainable production of products (Baumgartner & Korhonen, 2010).

Instead of addressing end-of-pipe problems, some research suggests that designing for the root cause of problems is a more appropriate approach. Wolfgang Sachs (2003, p. 41) argues that instead of chasing the “nanograms of harmful substances at the tail end” of production there is a need to measure the “megatons of nature put in at the front end.” Despite the criticism of incremental change and end-of-pipe type solutions, “moving from 9% sustainable to 9.5% sustainable is progress after all” (Chapman & Gant, 2007b, p. 36), and “our culture nibbled its way into this environmental mess and it will nibble its way out” (White et al., 2005, p. 64). Thus, doing something is better than doing nothing because it can create awareness of the messiness of problems associated with unsustainability, however incremental actions cannot be the only solutions. Therefore, in the remainder of this thesis I support the call for the need of more radical and fundamental changes to production and consumption cycles (Charter & Tischner, 2001; Lewis et al., 2001; Tukker & Tischner, 2006).

In summary, identified in Chapter one are concerns over current production techniques, which contribute to resource depletion, industrial pollution, and waste. This subsection critiqued efforts to solve those problems through making incremental changes to patterns of production. If incremental change focuses solely on eco-efficiency then research shows that it can cause further problems, but if it is part of a more holistic approach, which aims to make radical and fundamental change, then beginning with eco-efficiency can be one step on the road towards sustainability. The following subsection explores more radical change as I review the shift from products to services.

Changing Patterns of Production Through Moving From Products To Services

Life-cycle thinking, eco-efficiency and dematerialisation are methods and tools for designing in order to extend the life of a product incrementally, in this way avoiding the problem of built-in planned obsolescence. These approaches can reduce the generation of waste from products that break and cannot be maintained, however these approaches cannot be the only solutions. For one, they can cause more problems through having a rebound
effect, and secondly they do not address perceived obsolescence that feeds a throwaway culture (Charter & Tischner, 2001; Jelsma & Knot, 2004; Lewis et al., 2001; Tischner, 2006).

Successful product design therefore has to explore alternative methods, and move away from reliance upon incremental changes that “improve and re-style products for saturated markets and the societies of abundance” (Tischner, 2006, p. 23). Therefore, in this subsection I explore Product-Service Systems (often referred to as PSS) and examine the difference between focusing on what a user thinks they want compared to focusing on the results a user actually wants. I aim to find methods that are substantially more effective than those of an incremental nature, described above.

As previously proposed, sustainability includes social and ethical issues associated with a product’s life as well as environmental and economic ones. Alternative approaches that go beyond incremental changes are required to address the complexity of problems associated with design and sustainability, such as wider social issues, complex systems, technology and supply chains (Charter & Tischner, 2001; Lewis et al., 2001). These shifts in thinking will require a “redesign” and a “rethink” to achieve “radical new solutions” (Charter & Tischner, 2001, p. 127).

Chapter one discussed innovation as an approach to designing products. Here, following Marcel Crul and Jan Carel Diehl (2009), I explore their three different types of innovation: incremental, radical and fundamental as approaches towards sustainable design. These are described as:

- **Incremental innovation**: Entails step-by-step improvements of existing products and tends to strengthen market positions of established companies in the industry.
- **Radical innovation**: Drastically changes existing products or processes. The risks and required investments in radical innovation are usually considerably greater than those needed for incremental innovation but they offer more opportunity for new entrants to the market.
- **Fundamental innovation**: Depends on new scientific knowledge and opens up new industries, causing a paradigm shift. In the early stage of fundamental innovation, the contributions of science and technology are important (Crul & Diehl, 2009, p. 29).

The first of Crul and Diehl’s types of innovation obviously reflects incremental change, through the step-by-step improvements of products. The second and the third, however, begin to explore compelling new theories regarding how to approach sustainability and design. The latter, in particular, emphasises a paradigm shift in ways of thinking about design.

In a similar way to fundamental innovation, the concept of products-to-services is a radical change in approach from owning to renting. For example, moving from owning products to using services can advance notions of product sharing (Fletcher & Goggin, 2001). Shared products meet the same needs as personally owned ones but with fewer units, therefore each is used more intensively (Fletcher & Goggin, 2001; Manzini & Vezzoli, 2002; Tukker & Tischner, 2006; Vezzoli & Penin, 2006). Table 2.3 shows a comparison between
tradition product sales and Product-Service Systems, using the example of washing clothes. Emphasis is given to the levels of service, either User oriented or Results oriented.

Table 2.3.

Characteristics of Tradition Product Sales vs Product-Service Systems Sales (modified to include levels of service from Manzini & Vezzoli, 2002, p. 4)

<table>
<thead>
<tr>
<th>Traditional Product Sales</th>
<th>Innovative alternatives: Product-Service Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of service</td>
<td>Level of service</td>
</tr>
<tr>
<td>[User oriented]</td>
<td>[Results oriented]</td>
</tr>
<tr>
<td>Consumer buys a washing machine to clean clothes in house/hotel.</td>
<td>Consumer rents a washing machine to clean clothes in house/hotel.</td>
</tr>
<tr>
<td>Client owns, uses and stores washing machine. Consumer is responsible for maintenance and the ‘quality’ of the cleaning.</td>
<td>Company retains ownership of washing machine and is responsible for maintenance. Client is responsible for use and ‘quality’ of cleaning.</td>
</tr>
<tr>
<td>Initial investment for consumer could be considerable.</td>
<td>Consumer costs are spread over time (they pay a low initial deposit and then pay per wash).</td>
</tr>
<tr>
<td>Consumer ultimately disposes of washing machine and buys replacement.</td>
<td>Company is responsible for disposal and has incentive to prolong use of product, reuse component and recycle materials.</td>
</tr>
</tbody>
</table>

Arnold Tukker and Ursula Tischner assert that product-service systems are a radical change but “are not inherently more sustainable as products” (2006, p. 1553) [emphasis in original]. They suggest:

...many PSS form just an envelope around a system filled with products and materials. On a life-cycle basis they may not score much better than products. There is an improvement potential by diverting societal expenditure from products to services, but this is by far no Factor 4 or 10 (ibid.).

In this way, it is important to note that different levels of engagement with product-service systems exists (product, user, and results oriented services) and as such some are argued as being distinctly more sustainable than others (ibid.). Product-oriented services just add a service to the existing product system and therefore can be seen as not being greatly beneficial or sustainable. User-oriented services (such as the example in Table 2.3, or product renting, sharing and pooling) increase the product usage and reduce ownership thereby giving immediate results. The result-oriented service has the most potential, because it fully focuses on need, and “providing that the Product-Service Systems supplier develops a fully novel way of function fulfilment, these have ‘Factor X’ potential” (ibid.). I suggest
that these user-oriented and result-oriented services associated with Product-Service Systems, and combined with incremental improvements to designed objects, can alleviate unnecessary waste and assist in making consumption reasonable (Kronenburg, 2007).

Admittedly, Product-Service Systems will not have any benefits associated with sustainability if there is no change in consumer behaviour, for instance if consumers continue with bad habits, and incorrect or over-usage ensues (Fletcher & Goggin, 2001). An example, following the washing analogy, would be in the exchange of personal washing machine for self-service laundry hubs, where “incorrect dosing of detergents; unnecessarily high washing temperatures; and semi-full loads” (ibid., p. 21) equate to using fewer machines far more intensively (Charter & Tischner, 2001; Fletcher & Goggin, 2001; Jelsma & Knot, 2004; Lewis et al., 2001; Tischner, 2006).

Changing patterns of production through moving from products to services enables designers and producers to continue to develop through making radical changes. The key to this is that designers focus on results, rather than the user, and thereby reduce the quantity of material objects produced without hindering user requirements. However, Kate Fletcher and Phillip Goggin (2001) raise a question: how can consumers be prepared for a switch from personal ownership to the utilisation of services? This question requires a deeper consideration of what is required from designers if they are to influence a sea change in behaviour. The following subsection addresses these issues, specifically how designers can influence behavioural change.

**Changing Patterns of Consumption Through Behavioural Change**

A shift from owning to renting products or the use of public services is a radical change in approach, and could reduce production of objects and provide jobs for service designers. What it does not attend to is the behaviour of consumers; accordingly, this last subsection concerns patterns of consumption and literature relating to consumer behaviour. I assert that businesses, as well as consumers, must recognise the need for change, and desire to effect change. There are many different approaches to sustainable consumption. I explore different arguments implying that individual consumers, industry or designers are responsible for behavioural change to positively influence consumption. I build an argument that supports the notion that due to the complex and interrelated nature of sustainability a shared vision of a sustainable future is elusive, and, as such, individual consumers, industry and designer have an essential role to play. Sustainable consumption relies on designers fundamentally challenging design briefs, industry producing better goods and services, and motivated customers willing to invest in and spread good ideas.
Changing behavioural patterns.

In the previous chapter, I introduced the concept of over-consumption. I highlighted the addictive nature that some status symbol-type objects hold, and focused on problems associated with perceived obsolescence, the rise of the throw-away society and the advent of ‘retail therapy’ (Kang & Wimmer, 2008, p. 1147). Recent research into addictive behaviour links terminating a bad habit, such as over eating, with considerably reducing over-consumption. In particular, this research suggests that patterns of obesity are comparable to patterns of over-consumption (Kang & Wimmer, 2008). The similarities are listed as:

1. For substantial needs a certain amount of consumption is inevitable. However, consumption can easily lead to an undesirable habit both in eating and shopping behaviour if all our wishes and desires are answered in a way of immoderate and irrational consumption.
2. The habit is undermining the stability and the health of our bodies/environmental systems while, in many cases, they are not properly conceived.
3. For a radical change, multidimensional treatment is required.
4. Alternatives to the behaviour pattern need to be discovered and perceived to be attractive.
5. Success stories and enabling strategies can motivate the participants of cure programmes.
6. Feeders (providers) can be good curers and trainers, but they need to find good reasons to do so.
7. A long-term monitoring program is necessary to prevent the yo-yo effect (ibid., p. 1146).

Systemic approaches are necessary to reduce whatever kind of obesity is inflicted (ibid.). This approach therefore, focuses on the individual accepting that they have a problem, and (most importantly) wanting to, and making appropriate behavioural changes.

Addictive behaviours are, of course, habitual, and change is challenging, in this way there are specific stages to reach termination (Prochaska & DiClemente, 1983). James Prochaska and Carlo DiClemente identified four key stages of self-change for smokers who quit: precontemplation, contemplation, action and maintenance. Their “transtheoretical model of change” (ibid., p. 395) is widely used in social marketing (Moraes, Carrigan, & Leek, 2010). These stages have since been built-on by Paula Hunt and Melvyn Hillsdon (1996) to describe how people change addictive behaviours. Table 2.4 shows these five stages of change; the sixth is termination and indicates that the addictive behaviour has ceased.
Table 2.4.

_A Model for Change (Hunt & Hillsdon, 1996, pp. 30-31)_

<table>
<thead>
<tr>
<th>Stages of change</th>
<th>Obesity and commitment to eating healthy and exercise</th>
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<tr>
<td>Precontemplation</td>
<td>Not seriously considering the possibility of change, unaware or reluctant</td>
</tr>
<tr>
<td>Contemplation</td>
<td>Becoming aware, acknowledging existence of problem, considering possibility</td>
</tr>
<tr>
<td>Preparation</td>
<td>Make a commitment to change (within 3 months) but still ambivalent</td>
</tr>
<tr>
<td>Action</td>
<td>Start making changes (6 month) but not sustained</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Sustain programme of change, anxious about relapse</td>
</tr>
<tr>
<td>Termination</td>
<td>Free from temptation to relapse</td>
</tr>
</tbody>
</table>

These six stages move from being unaware there is a problem to being free from temptation. A common outcome for people who attempt to change is relapse, where they slip back a stage, so maintenance is key (Hunt & Hillsdon, 1996; Prochaska & DiClemente, 1983). Individuals are targeted and empowered to take control of their situation. It is important to this process that the practitioner not take on an authoritarian role, or imply that they are the expert, or tell the individual how to change (Hunt & Hillsdon, 1996). The individual must be free to choose to take advice or not; the aim for the practitioner is simply to keep the individual within the cycle until they reach termination (ibid). These stages of change and approaches to change are reminiscent of individual over-consumption.

Comparing addictive behaviours and obesity to over-consumption provides similarities of problems, however a divergence occurs when considering the outcomes. In recovering from obesity, health issues, lack of exercise and addictive behaviour, there are clear and tangible outcomes: people lose weight, get healthy, get fit, stop an addiction or not (as the case may be). However, the outcomes of living more sustainably are not so immediately obvious. An individual’s choice to live a more sustainable lifestyle does not dramatically alter their surrounding environment. This raises the question: how will mass behavioural change begin, let alone be maintained, if individuals cannot comprehend tangible results? This question, therefore, requires a deeper consideration of what is motivating individuals to change the way they live, and is explored below.

**Individual’s responsibility.**

Some individuals are currently and actively searching out sustainable solutions. Research shows they are prepared to commence stages of behaviour change in order to find the sustainable solutions that suit them (Meroni, 2007; Schumacher, 1973; Tischner, 2006). Such sustainable consumers are individuals who aim to live with less, often called “voluntary simplicity (or simple living)” (Marchand & Walker, 2008, p. 1165). Market research shows there are a growing number of individuals who are concerned about consumption and production patterns and are changing their behaviour. These people are
called LOHAS, who are defined as individuals who choose to live a Lifestyle of Health and Sustainability (Black & Crabtree, 2007; Cortese, 2003; LOHAS, 2010; McLaughlin, 2004; Moxie Design Group, 2006). These folk are described as:

...consumers interested in products covering a range of market sectors and sub-sectors, including: Green building supplies, socially responsible investing and ‘green stocks,’ alternative healthcare, organic clothing and food, personal development media, yoga and other fitness products, eco-tourism and more. They are described as a $209 billion US market and are collectively referred to as Cultural Creatives, Conscientious Consumers and represent a sizable market in the USA, Europe and Asia (Moxie Design Group, 2006, p. 3).

This research provided the Wellington based marketing research company, Moxie Design Group, with a unique insight into the differences between the international LOHAS and New Zealand sustainable consumers. The Moxie Design Group identified a comparable demographic which they called Solution Seekers and suggest that as of 2005, Solution Seekers comprised “thirty-two percent” of the New Zealand population (ibid., p. 2). These statistics indicate that individual behavioural change has already begun, as groups of conscious consumers seek their own sustainable solutions to a wide variety of unsustainable problems.

Some researchers assert that sustainable consumption, therefore, relies solely on individual responsibility. That is to say:

...everybody has the power to act. Kofi Annan once said ‘Sustainable consumption is about the power of individuals’. The choices of everyone determine consumption patterns, production patterns, [and] the degradation of natural resources, pollution and social progress. The sum total of trillions of individual choices in millions of life-cycles of products and services is what we are talking about when reflecting on sustainable development. That deserves further research. Unlocking this largely untapped potential is vital for a truly worldwide mobilization of creativity, which is so desperately needed for achieving sustainable development (Meroni, 2007, p. 5).

However, I disagree that everyone has the power to act. I suggest that financially secure individuals have more power to take action, while others in less secure monetary situations are more limited in their ability to act (Carew & Mitchell, 2008; Maslow, 1954; Pink, 2010; Tibbs, 2011; Udo & Jansson, 2009). In his hierarchy of needs, Abraham Maslow (1954) suggests that when incomes increase and people’s basic needs are met, then their perception of their own survival is more secure. Only then can priorities for these individuals change from basic (physiological and safety needs) to a more high-level of need (belonging, esteem and self-actualisation need) as illustrated in Figure 2.18.
In this way individuals can progress through a sequence of specific levels of need until they can become more motivated – or less occupied by survival – to pursue personal development, or what Maslow called “self-actualization” (ibid.). Thus, once an individual has moved past concern over survival then they have the power to act.

In many Western consumer societies there is more material prosperity and more opportunities to access a wider variety of goods and services (Reisch & Bietz, 2011). This means that in developed countries there is more possibility that enough ‘secure’ individuals with a shared common vision regarding a sustainable future can create significant change through their purchasing power. An example of these ‘secure’ individuals could be the ‘solution seekers’ identified in New Zealand in 2005 or the LOHAS in the United States, in each country, these two groups equate to just under a third of the population (Black & Crabtree, 2007; Cortese, 2003; LOHAS, 2010; McLaughlin, 2004; Moxie Design Group, 2006).

So, the movement has begun, but at what point does it reach critical mass? The spread of social epidemics is the theme of Malcolm Gladwell’s book, *The Tipping Point*. He explains the title as “the moment of critical mass, the threshold, [or] the boiling point” (2001, p. 12). Tipping point is a term previously coined by Morton M. Grodzins, and describes the instant that a formerly rare phenomenon rapidly and dramatically becomes more common (1969). Gladwell describes the social dynamics that can cause these rapid change as “the Law of the Few, the Stickiness Factor, and the Power of Context” (ibid., p. 19). The former relies on specific types of people called connectors, mavens and salespeople:

Mavens are data banks. They provide the message. Connectors are social glue: they spread it. But there is also a select group of people – Salesmen – with the skills to persuade us when we are unconvinced of what we are hearing, and they are as crucial to the tipping of word-of-mouth epidemics as the other two groups (ibid., p. 70).
Gladwell asserts these three pivotal types of people are responsible for starting word-of-mouth epidemics. The stickiness factor is whether something is memorable enough to spur someone into action, and the power of context essentially means that “context matters” (ibid., p. 167), which includes the environments children grow up in and “the critical role that groups play” (ibid., p. 171). Gladwell essentially argues that seemingly insignificant things can make a huge difference towards reaching a tipping point for “[i]deas and products and messages and behaviors [sic] [that can] spread like viruses do” (ibid., p. 7). So massive change not only relies on individuals who are convinced of the concept, but also on the right context in which particular people can spread the ‘sticky’ message.

In addition to the substantial proportion of society identified above, there are also groups of people who live sustainably, but do not necessarily claim to do so (or even recognise that they do so). In fact, creative communities of people all over the world initiate sustainable ways of living for very different reasons (Meroni, 2007). Anna Meroni distinguishes them as either, “utopian by design or by coincidence” (2007, p. 143). The latter are “motivated by some form of problem solving urgency,” while the former are “driven by positive visions and ideas about desirable futures, these are utopian by design” (ibid., p. 144). Being utopian by design is harder to achieve. Do individuals become utopian by virtue of their upbringing? Was it taught? Advised? Indoctrinated? Evidently, these individuals are conscientious consumers; yet further research would be needed to dispute whether the influence of specifically designed goods and services helped turn someone previously unsustainable into a sustainable utopian. Thus, sustainable consumption can be driven by motivated individuals, or by others that find they are sustainable but more by coincidence rather than by intention. Accordingly, industries response and responsibility to sustainable consumption is explored below.

**Industry’s responsibility.**

Not only can consumption be sustainable because of proactive consumers prepared to make changes, but also because a tipping point to be reached, specifically if industry takes a lead. For instance, Jonathan Chapman and Nick Gant assert that beyond the theory and the research, “it is industry where the decisions are actually made, where ideas are commoditised and realised in a physical form, packaged, shipped and sold, [and] where the materials are forged into products” (2007b, p. 36). In this way, the focus of responsibility is moved away from consumers to create change and back to designers and manufacturers, which is commonly called producer responsibility (described above: Changing Patterns of Production Through Incremental Change) or corporate social responsibility (CSR).

Corporate social responsibility dates back to the late 1970s. Archie B. Carroll (1979) proposed a four-part conceptual model of corporate social responsibility, indicating that corporations have four key responsibilities: economic, legal, ethical, and discretionary. The first (economic) summarises arguments from Chapter one, that described different
Chapter Two

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approaches taken for businesses to “produce goods and services that society wants and to sell them at a profit” (ibid., p. 500). The second aspect (legal) focuses on how “[s]ociety expects business to fulfill [sic] its economic mission within the framework of legal requirements” (ibid.). The third (ethical) concerns the moral responsibilities of a business, which are “ill defined” and therefore “are among the most difficult for business to deal with” (ibid.). Also, Carroll claims that more recently “ethical responsibilities have clearly been stressed — though debate continues as to what is and is not ethical” (ibid.). The last element (discretionary) “are those about which society has no clear-cut message for business” and are not necessarily responsibilities, but more of a philanthropic choice (ibid.). In short, the role of business within a sustainable framework has been outlined, if somewhat vague around the edges.

Building on and over the last fifteen years, strategies similar to corporate social responsibility have instigated a ground breaking rise in industry all over the world, specifically in language, tools, actors, practices and other strategies (Visser, Matten, Pohl, & Tolhurst, 2010). More and more businesses are incorporating these tactics into business as usual. For instance:

Companies such as Cisco, HP [Hewlett Packard], Gap, GE [General Electric], Interface, Nike, Patagonia, and Wal-Mart in the U.S. have become well-known as pace-setters in environmental sustainability. Ben and Jerry’s, Body Shop, Starbucks and Timberland are among the companies that are well respected for both environmental and social responsibility contributions (Sheth, Sethia, & Srinivas, 2011, p. 22).

However, it is important to note that these companies are the exception and not the rule (ibid.). Meaning that not only are individuals getting involved in a variety of ways, but there is also a sustainability movement that is gaining momentum within the business sector.

Designer’s responsibility.

Granted, there are people (whether in business or as individual consumers) who oppose notions of human-made unsustainability, and refuse to accept any form of change. Those who are resistant to behavioural change campaigns will need intervention from astute, innovative designers, engineers, or marketers to assist in interpreting issues of sustainability and its relationship with production and consumption (McKenzie-Mohr & Smith, 1999). In this way, designers have a challenging and important role to play.

Redesigning what already exists is not necessarily the answer. Rather addressing the problem necessitates essential activities that cannot be covered by some eco-efficient ecodesign or some sustainable design strategies (Manzini, 1994; A. Willis, 1999). Alternatively, “the environmental crisis has to be undesigned” (A. Willis, 1999, p. 7). Thus recognising that designers have the ability to encourage favourable behaviour is important (Fry, 2009; Lilley, 2009; Manzini & Jégou, 2003; Wahl & Baxter, 2008; A. Willis, 1999). So shifts in thinking about the foundation of design problems are required.
Some of the strategies described in the previous subsections focus on products, users, or results to influence consumer behaviour. However, a needs focus is a more appropriate approach (Fletcher & Goggin, 2001). For example, with the use of the clothes washing analogy:

...the shifting design emphasis can be plotted and shown to move from clothes washing (a product focus) through conceptions of clean clothes (a results focus), and finally to considerations of cleanliness (a needs focus). This is not just a semantic shift, but describes a substantial conceptual leap for problem solvers (designers and others associated with satisfying needs), and makes explicit a requirement to resolve traditional divisions between industrial sectors since needs are not sector specific (Fletcher & Goggin, 2001, p. 24) [brackets in original].

The argument here emphasises that a pivotal shift in thinking at the design problem stage is required in order to change from designing outcomes that specifically wash clothes to understanding the significance of cleanliness. This objective means fundamentally changing how some designers address the design problem.

Research shows there are a variety of tools and strategies available to help industry make these foundational and complex shifts in thinking. For instance, Chapman’s (2009, p. 33) “six-point experiential framework” is aimed at instigating emotional durability through “narrative, detachment, surface, attachment, fiction, and consciousness” associated with designing outcomes. Detailed online tools are aimed at providing information, inspiration and networking potential. For example the O2 Global Network is a “sustainable design website: linking people, ideas and tools” (see www.o2.org) (Charter, 1998, p. 58; see also Lofthouse, 2006). Information/Inspiration is a British-based, online tool developed from empirical research on new ways to present eodesign tools to industrial designers (see www.informationinspiration.org.uk) (Bhamra & Lofthouse, 2003; Lofthouse, 2006). SCORE (Sustainable COnsumption Research Exchange) is classed as a coordination action group that brings together “business developers, designers, consumer scientists and system innovation specialists” (Tukker & Tischner, 2006, p. 1555). The intention of SCORE is to find credible pathways of sustainable food, transport and housing (see www.score-network.org) (ibid.). Other websites are designed to facilitate discussion and research on the topic of sustainable design, for instance the Centre for Sustainable Design (see www.cfsd.org.uk), the Sustainable Everyday network (see www.sustainable-everyday.net) and the Droog Conceptual Design Company (see www.droogdesign.nl). All of these global online facilities engage interested participants in new ways of thinking and create networks of sustainable designers, consumers and producers.

In summary, I propose that patterns of consumption are already changing. A wide range of individuals and groups are now consuming in more sustainable ways, whether consciously or unintentionally, both in business and at home. Design practitioners too are ready for a new challenge, one that will incorporate many different fields of information and where collaboration, networking, and sharing information are key components.
Fundamental changes to design problems, driven by a needs-focused approach, will create better products that are designed and consumed sustainably. In this way, motivated people (consumers, industry officials and designers) might just be the mavens, connectors and salespeople needed for sustainable consumption to reach a tipping point.

‘Wicked Problems’ of Design and Sustainability

Within this section, The Breadth of Sustainable Design, the relationship between design and sustainability has been investigated. In particular, three types of unsustainable patterns, outlined in Chapter one, created a framework to review more sustainable practices. What is evident, from this second chapter is that there are a wide variety of conceptions and approaches to understanding interrelated issues surrounding sustainable design. Earlier in the chapter, ‘wicked problems’ were introduced in relation to design and to social complexity; such complex problems are peppered throughout people’s lives (Conklin, 2006; Palmer, Smith, Willets, & Mitchell, 2007). These specific types of problems are not found in the field of design alone; similar problems can be recognised in a variety of other fields. For example, the magazine of Toronto’s Rotman School of Management (2009) is 132 pages devoted to Wicked Problems. In this edition, Neumeier reports “[t]he number-one wicked problem cited by corporate leaders was the conflict between long-term goals and short-term demands” (2009, p. 47). This type of problem neatly encapsulates the problem space sustainability and design so often must work within.

There are many differing ideas of what sustainability means, often with conflicting objectives; with the constant threat of a solution to one problem causing a problem elsewhere (Madge, 1997; Mont & Pleps, 2008; Palmer et al., 2007). These types of ‘wicked problems’ “call for integrated and flexible design solutions that are appropriately adapted to the eco-social complexity of their scale-linking context” (Wahl & Baxter, 2008, p. 75). In this way:

As an integrative and transdisciplinary process, design thinking can inform more integral/holistic solutions that promote the emergence of systemic health and sustainability as properties of the complex dynamic system that contains culture and nature, and of which we are integral participants (ibid., p. 73)

Following Daniel Wahl and Seaton Baxter, I suggest that designers should be placed at the centre of “facilitating sustainable solutions” (ibid.), and in doing so should draw upon the insights gained from considering how to approach ‘wicked problems’, as a process of understanding complexity and connecting design and sustainability. The following section again concerns sustainability, but this time focuses specifically on education.

Sustainable Education

If, as I identified in the previous chapter, defining sustainability is challenging, still more so are designing scenarios for sustainable futures. Therefore, the intention of this thesis is to identify processes and approaches that can build capacity and capability for
sustainable education, it is not to critique sustainable curriculum, how students learn, or how teachers teach. These fields of research are in themselves broad and very complex, and in this way, the focus of the thesis is not the pedagogy of teaching, but the philosophies and conceptions of the teachers themselves. For this reason, my discussion of the literature surrounding sustainable education is a comparatively brief but thorough one. Notwithstanding its importance in the broader sustainability debate, I aim to present a critical summary of relevant research in order to facilitate discussions in later chapters. Thus, building an argument that education is one of the most powerful tools for addressing issues of sustainability. Not only does education allow for accumulation of knowledge and the development and experimentation of ideas, but it also helps provide an already established design industry with the latest strategies for addressing the complexities of sustainability.

Whether or not the term sustainability, or how to approach it, is agreed upon, the process of educating students in sustainability is well underway. As previously indicated, initiatives such as *The United Nations Decade of Education for Sustainable Development* (2005-2014) are in place. Through this programme UNESCO intends to assist with the integration of sustainable development into all facets of teaching through “encouraging learners to view the world through a lens of concern for sustainability and, consequently, for sustainable development” (2007, p. 5). There is an enormous international push to see economic, social and environmental sustainability adopted globally in education.

Many researchers argue that there is an urgent need to move towards a sustainable future, yet a collective vision of what that sustainable future could be is missing (Fien & Tilbury, 2002; Hopkins & McKeown, 2002; B. Sterling, 2005; I. Thomas, 2009). However, clarifying what is meant by sustainability or sustainable development, and how it might be taught, is the topic of some debate (Fien & Tilbury, 2002; Hopkins & McKeown, 2002). Sustainable education is the offspring of the environmental education movement; despite its more focused name it was equally complex. John Fien has been debating the what, whys and how to’s of both for a number of decades (Fien, 1993a, 1993b, 2002; Fien & Rawling, 1996; Fien & Slater, 1981; Fien & Tilbury, 2002; Fien & Wilson, 2009). Yet, he still asks “[w]hat criteria are most apt for deciding the sustainability questions, issues and problems to research? Unfortunately, no single set of criteria can be provided” (Fien, 2002, p. 252).

The *Talloires Declaration* states that to increase awareness of environmentally sustainable development universities must, “[u]se every opportunity to raise public, government, industry, foundation, and university awareness by openly addressing the urgent need to move toward an environmentally sustainable future” (University Leaders for a Sustainable Future, 1990, p. 1). However, when determining what is meant by “an environmentally sustainable future” within the *Talloires Declaration*, the only description is online, under the title, *What do we mean by ‘sustainability’?*: 
‘Sustainability’ implies that the critical activities of a higher education institution are ecologically sound, socially just and economically viable, and that they will continue to be so for future generations. A truly sustainable college or university would emphasize these concepts in its curriculum and research, preparing students to contribute as working citizens to an environmentally healthy and equitable society. The institution would function as a sustainable community, embodying responsible consumption of energy, water, and food, and supporting sustainable development in its local community and region (University Leaders for a Sustainable Future, 2008).

Although these are positive sustainable goals to work towards, a criticism is that missing from the list is the promotion of systemic, critical and creative thinking, skills which are essential for leaders to understand, visualise, and address complicated and fast-paced problems found in the world today (Swett, 2005; P. M. Williams, 2008). It is necessary for leaders to have an understanding of how people, actions and environments are all interconnected, have an ability to work with others and be able to interact with people and environments (Goleman, 2004; P. M. Williams, 2008). In other words, compartmentalising sustainability into either society, environment or the economy can mean missed opportunities to ground sustainability in current approaches to other complex problems. These missed opportunities reflect aspects of previous arguments, specifically approaches to understanding sustainability (see Figures 1.3 and 1.5 in Chapter one), where issues relating to the environment or to society can become add-ons and not truly integrated (Shedroff, 2009).

Underpinning these understandings is a deeper and more contentious debate. Discourse on sustainability often points to inherently ethical decisions. For instance:

Is a river the veins of the land or simply potential energy and irrigation? Is a forest a sacred grove or just timber and pulp? Is soil alive or merely dirt? Is a house a home or just a piece of real estate? Is the planet a sacred creation or a world of opportunity? Our values and beliefs shape the way we treat our surroundings (D. Suzuki, 2010, p. 91).

Similarly, John Fien and David Wilson specifically indicate “[a]s a focus of learning and cultural change, sustainability requires a conscious commitment by all to reflect upon the values and principles that guide our actions” (Fien & Wilson, 2009, p. 13) [emphasis in original]. Also, Alan AtKisson firmly asserts that issues surrounding sustainability are inherently ethical decisions, contending “first, you have to care” (2008, p. 15). With these types of précis it is not surprising that progress in sustainable development has been slow (Baumgartner & Korhonen, 2010). Sustainable development is essentially about improving quality of life for every individual, yet this can be interpreted in vastly different ways due to social constructs, culture, politics and financial situations and undoubtedly reinforced by personal ethics and values (Tilbury & Wortman, 2004). In other words, understandings of and visions of a sustainable future will be different for everyone.

So, if sustainability and sustainable development are moral concepts as opposed to scientific ones (Fien & Wilson, 2009), then how can they be included in higher education? This question is the source of further discussion. Some scholars argue that universities are
not the place for teaching values and ethics. Stanley Fish (2008) is a prominent exponent of this view. He sees the role of higher education as being to equip students with the skills to advance bodies of knowledge, and not to bring an end to society’s problems. He insists that academics should rethink what they are teaching and stick to doing their job; it is not the role of teachers to indoctrinate learners with morals (ibid.). However, Fish’s criticisms of the inclusion of values and ethics in education have come under fire in turn, as academics jump to their defence:

Today’s schools, colleges and universities serve the needs of the industrial society, fostering consumerism, technicism, competition and individualism. They prepare students to become willing cogs in a vast dysfunctional economic machine. Their approach to learning emphasizes theories over ethics, detachment over relationship, and immediate answers over thoughtful inquiry. Based on a worldview that asserts the superiority of our species above all others, mainstream education perpetuates the patterns of thinking and behaving that cause the ecological crisis (Davies, 2009, p. 215)

Here, Davies notes that whether values are intentionally included or not, they underpin many different areas of education. She specifically identifies implicit ethical bias that have negatively affected and potentially caused the ‘ecological crisis’. Despite a wide variety of principles already being included in learning societies, for advocates of sustainability including values in teaching still poses a conundrum. For instance:

If values are explicitly incorporated in the curriculum they could be accused of imposing ideologies on learners. But if all mention of values is expunged from education then this leaves little choice but for learners to draw their values from the unsustainable society around them, or from the values latent in the ‘hidden curriculum’ of their educational institution (Newman, 2009, p. 99).

Jeremy Newman contends how educators “are faced with a double edge sword” in terms of whether or not to include sustainability (ibid.). He acknowledges that it is not the role of the university to teach values specifically, yet questions how else individuals will be exposed to all sides of the sustainability argument. In contrast, research shows that universities are the place for tackling hard to define and complex problems. For example, Michael M’Gonigle and Justine Starke’s work “celebrates the university for what it uniquely is – a place where society can think differently, act differently, and can do so right where its citizens live” (2006, p. 17). Furthermore, bringing these debates into the higher educational institutions can provide opportunities to overhaul out of date pedagogies, for instance:

The fact that ‘sustainability’ is a messy, ill-defined concept gives universities the opportunity to grapple with the concept and develop new ways of thinking about the concept. Sustainability provides colleges and universities an opportunity to confront their core values, their practices, their entrenched pedagogies, the way they program for student learning, the way they think about resources and allocate these resources and their relationships with the broader community (Wals & Jickling, 2002, p. 230).

In this way, ill-defined and messy notions of sustainability can be placed firmly in the hands of higher educators in order to create an active, transformative process of learning that
allows values to be lived out and debated (Bergeå, Karlsson, Hedlund-Åström, Jacobsson, & Luttropp, 2006).

As an alternate view, I propose that sustainability is not necessarily values-based but more knowledge and skill-oriented. In other words, sustainable education can be like any good education and pertains to help graduates acquire specific attributes throughout a course of study. Graduate attributes can be described as:

…the qualities, skills and understandings a university community agrees its students should develop during their time with the institution. These attributes include, but go beyond, the disciplinary expertise or technical knowledge that has traditionally formed the core of most university courses. They are qualities that also prepare graduates as agents for social good in an unknown future (Bowden, Hart, King, Trigwell, & Watts, 2002).

A recent Australian study into Changing perceptions underpinning graduate attributes shows the four underpinning conceptions of: “employability; lifelong learning; preparing for an uncertain future; and acting for the social good,” are “frequently replicated uncritically in institutional and governmental policy and planning documents” (Bosanquet, Winchester-Seet, & Rowe, 2010, pp. 106-107). Moreover, the study identified a further three attributes of: “adapting to change, promoting change and community leadership” that have emerged in the past five years (ibid., p. 116). So a recent change in emphasis of graduate attributes now aligns more towards community and participation (ibid.).

In comparing these particular attributes to some sustainable education literature, many similar desired capabilities are evident. For instance, the development of competencies in thinking critically and creatively (Fien & Wilson, 2009; S. Sterling, 2009; I. Thomas, 2009; Tilbury & Wortman, 2004; Wals & Jickling, 2002) systemically (Hopkins & McKeown, 2002; Ryan et al., 2010; S. Sterling, 2009; Strachan, 2009; Tilbury & Wortman, 2004), holistically (Dawe et al., 2005) and strategically (Baumgartner & Korhonen, 2010), as well as problem solving, interdisciplinary thinking and team work (Dawe et al., 2005; Tilbury & Wortman, 2004) are all promoted. Also, there is an expectancy that knowledge and skills are blended, and a practical level of understanding enables students to continue learning after they leave the education facility (Hopkins & McKeown, 2002). These combinations of knowledge and skills, therefore, can progress graduates towards the desired attributes suggested above.

So rethinking what sustainable education incorporates is vital for more successful engagement. This new approach must reorient the previous ones towards a transition of change (S. Sterling, 2001). Thomas asserts:

If we are to educate students to achieve sustainability in the absence of a clear understanding of the physical and social representations of sustainability, we need to be facilitating a process that explores the relevant territories to assist us all on our ‘journey’ to sustainability. Hence, our option is to base learning approaches on
developing understanding and competence in the processes that have the potential to lead to sustainability (I. Thomas, 2009, p. 250).

Through explaining the ‘territories’ necessary for moving towards sustainability, Thomas builds a picture of sustainable education with critical thinking at its core.

Conceivably then, the educators themselves are key to ‘good’ education. For instance, holistic teaching that encompasses the “educators as role models and learners” or teaching that involves “experiential learning by reconnecting to real-life situations” (Dawe et al., 2005, p. 4), builds capacity for a wide range of graduate attributes. Moreover, “[s]everal threads run in parallel to show that we need to develop critical thinking in students but to do this we also need academics to be thinking critically about their curricula” (I. Thomas, 2009, p. 260). Therefore, all educators are essential for delivering this ‘good’ education, whether capacity building, critical and systems thinking, or through experiential learning.

With this in mind, teachers may need different tools to support the inclusion of sustainability in higher education. Sterling argues how transformative learning is responsive and dynamic, allowing for “local ownership” for learners, whereas in more traditional, rigid methods of transmissive learning, “control is kept at the centre” (S. Sterling, 2001, p. 38). So, in order to attain “the needed level of transformative learning it seems essential that teachers and learners tend to ‘share and do’ rather than ‘show and tell’” (Bergeâ et al., 2006, p. 1441).

In summary, despite lacking in a shared vision, sustainable education is already undertaken around the globe. Nevertheless, significant differences in understandings are evident. Contentious issues regarding values in terms of sustainability lead to debates as to whether or not subjective topics should be included in higher education. On the contrary transformative approaches to education not only allow for accumulation of knowledge, and the development and experimentation of ideas, but can also incorporate skills homogenous with many graduate attributes. In this way, a gap in the research is identified as to how sustainability is understood, in particular by educators actively including the topic in their teaching and practice. Questions concerning whether sustainability can be included as an add-on to current curricula or whether a whole curriculum rebuild or redesign is in order.

The final section of this second chapter builds on these ideas of sustainability and education through exploring sustainability in design education. In the process developing an argument for my research problem and questions (introduced at the end of Chapter one, and developed in Chapter three).

**Sustainable Design Education**

So far in this chapter I have evaluated and critiqued various understandings of design, and have assessed the capacity of designers to address ‘wicked problems’. I conclude that because of their capability to influence patterns of production and
consumption, designers must be fundamental in driving elements of sustainability. The previous section discussed work in the field of sustainable education. I suggest there is a marked lack of research regarding how different conceptions of sustainability (values-based or knowledge/skills based) can affect how sustainability is integrated in education.

Some argue however that today most global design courses do pay attention to sustainability – that teachers are “quietly teaching these matters to a lesser or greater extent” (Durling, 2009, p. 1). If so, what is it they are quietly teaching? In this final section, I address David Durling’s statement and review the global approach to sustainable design education. I build an argument that emergent social networks, collaboration and transdisciplinary methods of teaching are evident regarding sustainability, design, and education, despite the absence of straightforward answers and a distinct lack of an ideal state. Nevertheless, not all types of ‘quietly teaching’ is helpful for understanding and incorporating sustainability into the teaching and practice of design.

Pressure to include sustainability into design education comes from a variety of sources. I propose that in some cases, the need to integrate sustainability might be driven by a requirement for experts within the field of sustainable design (Boyle, 1999; Hagan, 2003; Pochat et al., 2007). However, I also suggest that it might be driven from students’ demand, especially those who can see the benefit upon graduation (Boyle, 1999; Hagan, 2003; P. M. Williams, 2008). Building on the previous section on Sustainable Education, Carlo Vezzoli and Lara Penin (2006) argue that university is a good place to attempt to implement sustainable principles, since it is a breeding ground for untamed innovation and creativity, a hub of activity, and is populated by young impressionable people who crave guidance.

Other design researchers have focused on determining how design educators understand sustainability. Mariano Ramirez’s (2007) worldwide study of 221 schools, titled: Sustainability integration in industrial design education found that:

Most participants seemed to interpret sustainable design as being identical with ecological design or green design, which focuses mostly on minimization of environmental impacts and usually not covering the aspects of promoting an equitable society (Ramirez, 2007, p. 3).

Ramirez indicates that the focus of sustainability in design has been on the reduction of impacts on the environment. Interestingly, he contends that concern is more often focused on environmental rather than social or economic issues. Matthew Watkins and Vicky Lofthouse’s Review of Sustainability within Product and Industrial Design Courses in British Universities also found that over a third of their designer participants “referred principally to environmental considerations in their definition” (2010, p. 2). Their findings, however, also “suggest that the majority of academics understand sustainable design in terms of social, environmental and economic considerations.” Both studies nevertheless indicate a preference towards environmental issues in relation to sustainability, over social and economic sustainability. These studies provide helpful points of comparison to complement
this research, as Ramirez studied high schools, while Watkins and Lofthouse focused on British universities.

Many tools, guidelines and frameworks are available to assist with the inclusion of sustainability in the discipline of design. Some include examples of sustainable design projects (Lofthouse, 2009; Tischner et al., 2000). *The Sustainability Handbook for D&T* [Design and Technology] *Teachers* (Capewell et al., 2007) provides simple, practical lesson plans and suggestions. *The Okala Guidelines* comprises of nineteen PowerPoint lectures, activities, readings and videos in a downloadable format online (White et al., 2005).

Both the Sustainability Handbook and The Okala Guidelines are largely focused on the environmental aspects of sustainability. Teachers using these resources will perhaps lean more towards concepts of incremental change rather than behavioural change. For such reasons, like others, I advise that there is limited literature on how to actually “accomplish true integration” of sustainability into design education (Boks & Diehl, 2006, p. 932).

So how can notions of sustainability truly be integrated into the discipline of design? Kate Fletcher and Emma Dewberry (2002) assert there are predominantly two approaches to integrating design with sustainability. One approach considers “design as context,” where sustainability fits alongside all of the other facets, activities and priorities of design and design education. The other approach considers “sustainability as context,” treating design as equal to other more traditional disciplines such as chemistry, philosophy, planning, and biology (ibid., p. 40). In this way, a transdisciplinary approach to integrating sustainability into the teaching of any discipline becomes the focus (Ashford, 2004; Hopkins & McKeown, 2002).

Researchers argue that sustainable teaching in design must move towards such a model as opposed to an inter-disciplinary or multi-disciplinary approach (Ashford, 2004). Inter-disciplinary research literally means “between disciplines,” while multi-disciplinary brings together several disciplinary focuses, thus dealing with more than one traditional concern, and a transdisciplinary focus is “across disciplines” (2004, p. 244). The latter transcends the narrow focus of one or more disciplines and is not constrained to adopt pre-existing models for problem definition or solution. For this reason Nicholas Ashford (2004) asserts that moving from inter-disciplinary through multi-disciplinary and on into the transdisciplinary realm can open up the problem space for the designer and student.

Other research also suggests that a transdisciplinary model of teaching is most appropriate to the task of integrating sustainability into design education. For instance, “sustainability requires crossing borders not only between different disciplines but also between science and practice” (Steiner & Posch, 2006, p. 878). A “[t]ransdisciplinary dialogue about how to design sustainably” is proposed as a way of “integrat[ing] the specialist knowledge of diverse disciplines in the search for more meaningful and
sustainable solutions” (Wahl & Baxter, 2008, p. 83). In this view, a transdisciplinary dialogue allows the transformative learning described in the previous section (Bergeå et al., 2006; Dewberry & Sherwin, 2002; Wahl & Baxter, 2008). Transformative learning is more likely to be achieved, however, when a problem is viewed from many perspectives involving unique combinations of knowledge and skills (Dewberry & Sherwin, 2002).

Collaboration within design projects is not a new concept but it is an important one to reiterate in the context of sustainability, because collaboration within design projects can facilitate transformative learning. Paul Rothstein (2002) contended it is a successful way of expanding students’ knowledge and attitudes towards creativity, leadership and teamwork. Rothstein brought business students together with graphic design and industrial design students under a project arena called, Innovation Space. In this space, specialists can provide expert information that might not be readily available to all academics (Boks & Diehl, 2006; Tischner, 2006).

Researchers at Delft University of Technology address the issue of implementing sustainability across the whole curriculum of engineering design through using an “individual interaction model” (Peet, Mulder, & Bijma, 2004). They argue that “when sustainable development is only taught in specific courses, it is questionable if engineering students are able to integrate it into their engineering practices and technical designs” (ibid., p. 278). For this reason they document attempts to educate their academic peers in integrating sustainable design into their own curriculum. The most successful and influential methods take into account “working with individual lecturers,” enabling the lecturers to experience “learning by doing” and “follow-up workshops,” and include a booklet intended to inspire and motivate lecturers (2004, p. 283). Others assert that specific workshops on sustainable design for teachers are a positive approach to educating the educators (P. Thompson & Sherwin, 2001; Tischner, 2006). Similarly, the organisational, academic and design culture must be taken into account, along with practice, teaching, and learning, if sustainability is going to be embedded into an institution (Fletcher & Dewberry, 2002; Peet et al., 2004).

Networking between experts and non-experts can provide sustainable resources and platforms for discussion. For example, DEMI (Design for the Environmental Multi-media Implementation Project) was a web-based resource (decommissioned since March 2007), which was set up in response to a number of British Governmental reports highlighting the “dearth of knowledge and activity about sustainability in higher education” (Fletcher & Dewberry, 2002, p. 38). DECS (Design in Emerging COntexts for Sustainability) is a current informal network of experts involved in designing sustainable Product-Service System strategies for their campuses (Vezzoli & Penin, 2006; Vezzoli & Sciama, 2007). Recent open-source, online education tools include the 2008 launch of LeNS (The Learning Network on Sustainability) (Vezzoli et al., 2008), and Integrating sustainability into design education: The Toolkit (The Designers Accord, 2009). The former is a network aiming to contribute to
curriculum development through the promotion of a new generation of designers and design educators focusing on Product-Service System Innovation. The latter was developed from a conference at the end of 2009, where 100 international academics and professionals convened specifically to create a toolkit for design education.

In some current literature obstacles to integrating sustainability into design education are identified. During the introduction of sustainable development into an engineering curriculum in Delft University of Technology, specific barriers were revealed (Peet et al., 2004). Three key categories of barriers were distinguished, the first concerns organizational culture, and barriers to top-down approaches to implementing sustainability. This barrier encompasses resistance to change because change is understood as being costly, hence there is a power struggle between departments, and the forcing of sustainability becomes an imposition and a threat to their position (ibid.). The second category focuses on academic culture, and hostility (specifically from the sciences) because staff members are considered a specialist in their own field and incorporating sustainability into their field means they are under pressure to retrain (ibid.). The third category specifically concerns engineering design culture. Here barriers to the inclusion of sustainability can be ascertained because some aspects (mainly social sustainability) are deemed as unquantifiable and impossible to measure, thus too hard to incorporate in design (ibid.).

In addition, the team at Delft University of Technology set up a pilot project to work on the approach of learning by doing. Their strategy included the “re-training of lecturers; involving students; top-down approach; disciplinary reviews; and individual interaction” (ibid., p. 281). The most successful approach to implementing sustainability was working specifically with individual teachers to help them personally understand and integrate sustainability into their teaching (ibid.).

In summary, there is a growing network of individuals and groups working towards the similar goals of developing different approaches to include sustainability into the discipline of design. Different approaches to sustainable design in education lead to many different toolkits. The following section synthesises this chapter by highlighting the gaps in current literature that have facilitated the development of the research problem and questions (from Chapter one).

**Summary and Conclusions**

So far in this review of literature, I have proposed that design can be defined in many different ways, including shaping, serving and giving meaning to people’s lives. In terms of theory, teaching and practice of design, I reviewed a range of theoretical discussions on the process of design, which led to how individual epistemologies drive either practice-led or theory-led education. Questions arise as to commonalities and differences in meanings of design between distinct groups of designers. For example, are there similarities between
conceptions of design between theory-based academics, theory- or practice-based teachers, students or practitioners? This question requires further research into specific meanings and variations of design.

Design as an academic discipline is still growing and there is much complexity associated with design and design education. The problems designers are faced with on a regular basis are ‘wicked’ in nature, with no stopping rules, and no obvious right and wrong solutions, these problems require a different set of tools and processes than simple, cause-and-effect type problems. A challenge for designers, therefore, is being able to recognise and suitably tackle ‘wicked problems’.

The activity of designing outcomes sits within the overarching title of production and ultimately impacts current levels of consumerism in society. Research shows that after post-war depression, consumption of goods was necessary to get economies back up and running, however the levels consumption has reached today are argued to be unacceptable and unsustainable (Chapman, 2009; Kang & Wimmer, 2008). A variety of different approaches to alter current patterns of production and consumption are underway. These range from incremental change (such as a reduction in material use), through a move from designing products to designing services, and into deeper explorations of designers’ roles in shaping fundamental behavioural change. What is missing from current research is how these different approaches can be affected by different understandings of the meaning of design and sustainability. This leads to the question of whether designers recognise the notion and implication of ‘wicked problems’ associated with design

Much of what is unsustainable is driven by design, if designers fail to recognise the connections between ‘wicked’ and tame problems in association with sustainability then more unsustainable design is likely to arrive. How does this complication translate into teaching and practice? Do design teachers and practitioners recognise design or sustainability as having ‘wicked problems’? If they understand design to be ‘wicked’ in nature, will they have more chance of identifying and addressing similarly complex problems associated with sustainability? These questions underpin the research problem.

Different modes of learning, from transformative learning, collaboration and networking have been identified as enabling the emergence of sustainable education in the discipline of design. Are there current obstacles to including sustainability in the discipline of design? If so, what are they? Are there enablers that can overcome these barriers? Is there a difference for sustainability experts who have worked in the field for years compared to sustainability newcomers just starting out? These questions, consequently, address a gap in the literature and inform my specific research problem and questions.

On the whole, I suggest there is a marked lack of research regarding how different conceptions of design and sustainability can affect how sustainability is, and can be,
incorporated in the teaching and practice of design. This research is important, and its lack will have consequences: future and current designers need better understanding of both design and sustainability in order to be prepared to tackle appropriately the complex problems associated with sustainability.

This literature review has shown that little empirical evidence exists to support or contradict the perceived gap of the inclusion of sustainability in the academic discipline of design, specifically in New Zealand. To facilitate the exploration of the research problem and the associated questions it must be located within a theoretical framework. Chapter three concerns the methodology and method of the present study and explores my personal context and theoretical assumptions, both of which further define the research questions.
CHAPTER 3

METHODOLOGY AND METHOD: RESEARCHING THE RELATIONS BETWEEN DESIGN AND SUSTAINABILITY

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Introduction

In the previous chapter, a review of relevant literature laid the foundation for this research study through unpacking the complexities, and highlighting the relationships between, design, consumerism, and sustainability in design education. I proposed how different conceptions of design lead to a variety of approaches and processes to education. I also asserted that designers are active contributors to change, which can be driven through actions of individuals, industries and designers. However, I also suggested that this type of change is not that simple because ‘wicked problems’ are ubiquitous for both design and sustainability. I supported the argument that education is also a vital contributor if these types of complex problems are to be addressed, which led to identifying the research problem and associated questions presented in Chapter one.

The focus of this third chapter is the methodology, driven by the research problem and questions, and the data to investigate them. An introduction to the methodology was outlined in Chapter one; Chapter two aimed to build on that introduction in order to provide assurance that appropriate procedures were followed. The chapter comprises of a description of my personal context and the implications that this has for the research; my theoretical assumptions; an elaboration of the research problem; research approaches; research methods (which include sources of data); data analyses; and methods of reporting. A wide range of terms are used within the literature (Crotty, 1998; Grix, 2002), so my specific interpretations of these and meanings that I attribute to them are detailed in each section. Figure 3.19 provides a summary of the methodological framework for the chapter.

![Figure 3.19. An illustration of the stages of the research methodology (adapted from Creswell, 2003; Crotty, 1998; Grix, 2002; Sarantakos, 2005)](image-url)
Figure 3.19 shows the influence of both theoretical assumptions and research methods within the research. However, an explication of the research methods also relies on knowledge of appropriate research approaches and their relationship with my theoretical assumptions (Creswell, 2003; Crotty, 1998; Grix, 2002). Researchers argue that “ontology is the starting point of all research,” closely followed by our epistemological and methodological assumptions (Grix, 2002, p. 177). Personal ontology grows out of personal context and past experience. It is this reciprocity of relationships that provides the key in establishing the research problem. Of necessity, the research problem along with theoretical assumptions influences and informs the research approaches adopted (Crotty, 1998). In this way, “provide[s] specific direction for procedures in a research design” (Creswell, 2003, p. 13).

It is widely acknowledged that theoretical assumptions influence the research problem and the subsequent choice of research approaches, which in turn influence research methods, sources of data collected, and the analysis process (Creswell, 2003; Crotty, 1998; Grix, 2002; Guba & Lincoln, 1994). The six interconnected stages illustrated in Figure 3.19 create the research methodology framework that underpins this thesis and shapes the structure of the chapter. The following six sections delve into how and why these stages build the underlying framework of the study.

Personal Context:
A Designerly Way of Thinking; Grounded in Sustainability

This section is about locating myself within the research: acknowledging my personal history of experiences and meanings; and recognising potential influences, interpretations, and decisions. Personal experiences and unique backgrounds can influence research approaches, analysis, and findings (Crowson, 1993; Patton, 2002; Wolcott, 1993), arguably enabling or preventing researchers from seeing, interpreting, and describing “intellectual, aesthetic and emotional transformations” in the encounters and experiences they seek (Robertson, 2002, p. 790). However, it is not possible to divorce a person from their identity (I. Cook, 2005), so the following descriptions acknowledge my positionality and the potential biases addressed within this study, specifically my understanding of design and sustainability, and the relationship between the two.

My undergraduate education, and previous experience in furniture and product design, led me to a project manager position and more recently, a design educator post. Design as a profession is often referred to as a pragmatic discipline resulting in the fabrication of functional things, such as images, objects, and environments (Buchanan et al., 2010). At the beginning of the second chapter, I explained a societal perspective of the meaning of design through the use of John Heskett’s (2002) notion of shaping, serving, and giving meaning to the world in which people engage. I went on to investigate the evolution
of design research from a practice-based to a theory-based academic discipline, exploring and critiquing different meanings for and origins of design. Here, in Chapter three, I once again refer to design. However, the difference in this chapter is that I now reflect on how my own understanding of design influences my decisions. Specifically, I focus on the notion that there is a particular designerly way of knowing, thinking, and acting (Archer, 1979a; Buchanan, 1992; Cross, 1982, 1999, 2001), and that conceivably this conception of design affects my ontology, epistemology, and, therefore, my choice of methodology.

In Chapter two I proposed that the boundaries between practice and theory are (and will remain) blurred. In my personal experience, I sit between the two. My understanding of design stemmed from participation in a pragmatic, hands-on discipline but with time and through experience I have moved towards a meta-level thinking of design, a journey that has been long-winded and challenging. I became a designer through a practical and experiential learning process that taught me how to engage with ethnographic methodologies, ergonomic principles, and reflection-in-action type processes to create tangible products and services that ensured the user was always the focus. As I moved through my career into my current position as a researcher I had to face the complexities of deeper theoretical understandings and the rhetoric around what ‘design’, and more recently, what ‘sustainability’, really amounts to. My appreciation of design has deepened, and my comprehension of sustainability has diversified and expanded.

What Design and Sustainability Mean to Me

Understanding the specific meanings design and sustainability have for individuals is a very important aspect of the research intentions. Therefore, it is imperative to also clarify what these mean to me, and how these understandings might influence my worldview and interpretations of the research. Within design literature there is an ongoing debate about the rudiments of the academic discipline of design (Archer, 1979b; Cross, 1982; Findeli, 2001; Nadler, 1980; Simon, 1968). However, determining whether design is art-based or science-based is relatively inconsequential for my chosen research approach. This discourse is due to the argument that “[n]either science nor art can exist outside of experience, and experience requires a subject matter. That subject matter is qualitative” (Eisner, 1998, p. 27). With this in mind, I suggest that importance does not lie with where the foundations of design are located, as all design research centres on experience; this is a key reason why I have adopted the qualitative research methodologies that are outlined in this chapter.

In short, I identify as a designer, although the physical production of designed objects was only a brief phase in my career, and my understanding has changed, from an earlier focus largely on design as a practice, to also accommodate the theoretical and methodological approaches of design. In particular, I now describe my understanding of design as having many ‘wicked problems’, which cannot be solved with tame, linear
processes. Design is interrelated to every discipline, even though it is an emerging discipline in its own right, thus collaboration is the key to generating successful ideas. Design is continually growing, in research, in theory, in practice, in education, and seen in this way there is no right or wrong of design, there is only better or worse. Furthermore, design means to me, a way of learning, knowing, thinking, and acting, all of which are objectives embedded in my worldview. Everything I do, I do within a framework of design.

Not only do I consider myself a designer, I also have theories of sustainability underpinning my philosophy of life. For me, sustainability is not just the latest ‘buzzword’, it is also a way of learning, knowing, thinking, and acting. Throughout the course of this study my understanding of sustainability has dramatically augmented; I describe this change as a shift from a Venn diagram (see Chapter one, Figure 1.3) into a nested diagram (see Chapter one, Figure 1.5). The Venn diagram shows how the three branches of sustainability are predominantly separate, with small and hard to find overlaps, for a designer these are often the pursuit of reduction, reuse and the recycling of materials (Bould, 2007). Alternatively, Figure 1.5 illustrates the three aspects of sustainability as concentric circles that are so inter-connected they cannot be separated. In my understanding, this model better represents how economic decisions affect societal decisions, which in turn affect environmental ones, and visa-versa. This model is easily adaptable and different understandings of sustainability can be added, such as cultural or political sustainability.

I commenced this research as a passionate, motivated individual who wanted to change the world through the only way I knew how: to actively campaign and communicate with people about the damage that human beings are causing to the planet. I wholeheartedly followed David Orr’s argument, “what good is a rigorous research agenda if you don’t have a decent planet to put it on?” (1992, p. 163). So my motivations originated from a desire to save the world. My experience with this research study has dramatically altered my perspective, although I will never lose my passion and motivation to change unsustainable practices (Bould, 2009b). I have learned that there is no right and wrong in sustainability decisions, only better or worse and that sustainability is about integrated and complex scenarios that require integrated, systemic thinking, and approaches (Mann & Bould, 2011; Palmer et al., 2007; Ryan et al., 2010; Shedroff, 2009; S. Sterling, 2001, 2004, 2009; S. Sterling & Thomas, 2006; I. Thomas, 2009; Tilbury & Wortman, 2004; Wahl & Baxter, 2008).

My understanding of the relationship between design and sustainability has also evolved under the influence of many researchers, and throughout the process of writing this thesis. For instance, I have learned that problems of design and sustainability can be approached in identical ways, specifically through a comprehension of systems, critical, and creative thinking, of understanding consequences, connections and collaboration, in combination with a sense of care and an understanding of the meaning of community, conduct and contribution (Bould, 2009a; Mann & Bould, 2011). Figure 3.20 illustrates the
evolution from sustainability being within the context of design (specifically within boundaries of design) to designing within the context of sustainability and where everything is connected (Dewberry, 2009; Dewberry & Monteiro De Barros, 2009; Fletcher & Dewberry, 2002).

Figure 3.20. Sustainability in design / Design in sustainability (Dewberry, 2009, p. 6)

As a result, design and sustainability feature in my worldview as more than just my profession but as deeply rooted in my basic assumptions and my construction of reality. These experiences have generated conceptions and meanings that create my unique personal history and my worldview (Dillon & Howe, 2003; Robertson, 2002). Thus, acknowledging that my ‘designerly way of thinking’ is fundamental within a context of sustainability will influence my ontological and epistemological assumptions in relation to the research problem. Hence, the disclosure of my positionality and my theoretical and methodological assumptions that could potentially bias my interpretations are one attempt to decrease the issue. These theoretical assumptions are explored in the following section, and the research problem is analysed in the section afterwards.

**Theoretical Assumptions:**
**Constructivism and Interpretivism**

In the previous section I acknowledged my personal circumstances as being focused on design with the interconnectedness of sustainability. In this section I outline my ontological and epistemological beliefs that inform my worldview (Guba & Lincoln, 1994) and I provide a theoretical framework within which the research problem and the research approaches can be explored.

My assumptions about the nature of reality are embedded within the theory of constructivism. In this view, individuals’ understandings of knowledge are socially constructed and they make meaning of their realities (Creswell, 2003; Crotty, 1998; Grix, 2002; Guba & Lincoln, 1994). The distinction between socially constructed realities and the
positivist perspective of ‘the reality’, is that the latter insists on the existence of only one reality, alternatively constructivism indicates there are many realities (Sarantakos, 2005). Thus, social constructs are generally understood to be the planned or unplanned consequences of numerous human decisions, rather than doctrines stemming from absolute existence.

Constructivist perspectives on the nature of being are tightly interwoven with the manner in which knowledge is gained. Ontology and epistemology are inclined to emerge together (Crotty, 1998; Love, 2000c) or at least one immediately follows the other (Grix, 2002; Sarantakos, 2005). In this view, “realities are apprehendable in the form of multiple, intangible mental construction[s], socially and experientially based, local and specific in nature (although elements are often shared among many individuals and even across cultures)” (Guba & Lincoln, 1994, p. 116) [brackets in original]. Thus, not only do humans socially construct knowledge and meanings but they do so through their own interpretations of how they engage with the world (Creswell, 2003; Crotty, 1998; Grix, 2002), and how they attach meaning to the actions of others (Minichiello, Aroni, Timewell, & Alexander, 1990).

The intimate relationship between the sociological theory of knowledge and the nature of being implies that humans act on their interpretations of knowledge and construct reality. Therefore “knowledge, and the ways of discovering it, are not static but forever changing” (Grix, 2002, p. 177). My interpretations and constructions of the world are not static but forever changing. I firmly understand that we create our own realities and construct those realities through our interpretation of our interactions of the relationships we experience with objects, our environments, and with other people. I acknowledge that as a researcher I have been, and will continue to be influenced by, learn from, and develop through, the interactions I have throughout the duration of this research. The insights of others have impacted on my understandings, and my surroundings have had a role in the development of my opinions and views. Furthermore, my personal context together with my growing theoretical beliefs were the driving force behind establishing the research problem. I view the world through these lenses but I have also tried to find balance and objectively gather and analyse data.

Therefore, my social constructs influence my interpretations within this thesis, and are informed by a wide variety of influences. These influences include cultural, historical, religious, political, social or personal contexts (Crotty, 1998; Dillon & Howe, 2003). My understandings of interpretivism are embedded within a constructivist perspective and discernable in the way I actively interpret situations, environments, and interactions I have in the world. As a researcher who relies on constructivism and interpretivism I am explicit in my personal context and, later in this chapter, I elaborate on how I interpret the data, specifically because varying contexts, methodologies and reasons for the study would
initiate different narratives and stories (Patton, 2002). I acknowledge that different interpretations of the same data could produce entirely different categories and elements.

My position suggests a relativist orientation in which I am responsive to multiple perspectives within a constructivist framework and a qualitative methodology. My qualitative methodology is explored in the section on research approaches, while the next section is concerned with the development of the research problem, which was established initially from personal context but further defined through a review of relevant literature and the theoretical assumptions outlined above.

**Research Problem:**

**Sustainability in the Teaching and Practice of Design In Aotearoa/New Zealand**

In the first section *(Personal Context)*, I explained my ‘designerly way of thinking’ and how it is framed within a context of sustainability. The second section explored my ontological and epistemological understandings, indicating my belief that individuals make meaning through constructing their own realities. These personal and theoretical assumptions, alongside a gap in the literature, and have shaped the research aims and objectives, the questions posed and the subsequent methodologies with which they were addressed (Freebody, 2003; Grix, 2002). Accordingly, this section focuses on the research problem.

Informed by the previous assertions and assumptions, and as previously indicated, the main problem associated with this research is: **Change is often facilitated through education, so how might sustainability be integrated into the teaching and practice of design (and to what extent is it already) in Aotearoa/New Zealand?** The literature review (Chapter two) highlighted the complexities associated with the words design, sustainability, and sustainable design. The review and my personal and theoretical assumptions emphasised the dominance of design, therefore throughout the remainder of my thesis, the word ‘sustainability’ is used to mean notions of sustainability in the context of design, unless otherwise stated. Also one of the key findings in the review of literature, where I explored design in education, was the notion that design can be theory-led or practice-led. This underpinning of design influenced my choice of participants, who include theory-based academics; theory or practice-based teachers; students of those design teachers; and practice-based practitioners. So, for the purpose of this study, the word ‘designers’ indicates individuals involved with design. The sampling of data sources is explained in more detail in the research methods section *(Purposeful Sampling)*. The research approaches and methods, sources of, and process of, data analysis that address these questions are described and discussed in the remaining sections of this chapter.
Research Approaches:
Grounded Theory, Case Study and Interviews

My contextual understandings are entrenched in the discipline of design, which is based on the pragmatics of product design, and grounded in sustainability. My ontological assumptions are located within social constructivism and my epistemological assumptions are embedded within interpretivism. Therefore, I have adopted a qualitative methodological umbrella. These methodological assumptions combined with the research questions described above suggest the potential of research approaches using interviews and data analyses underpinned by grounded theory and case studies. The relationships, rationales and the credibility of these choices are explored below.

Principles of Grounded Theory

As previously discussed, my assumptions and approaches are influenced by design and sustainability thinking, and originate from an intuitive, reflection-in-action type approach to qualitative research methodologies. Considering the constructivist and interpretivist nature of these assumptions, the choice of grounded theory as a research approach could appear counterproductive considering the positivist origins of its founders, Barney Glaser and Anselm Strauss (1967). The original development of grounded theory involved following strict rules; if a researcher missed any specific steps, their theory generation was deemed unworthy (Glaser, 2001). Furthermore, Glaser and Strauss (1967) argued that the preparation of a literature review prior to data gathering created bias within the coding process, and the absolute objective of grounded theory analysis was enabling categories, themes, and phenomena to become prominent from the data with little or no bias whatsoever. Given the constructivist nature of my ontological assumptions and interpretive epistemology, I found this definitive formula restrictive.

An alternative development in grounded theory is more aligned to my own theoretical assumptions, for this reason, I will borrow practical principles of grounded theory methodology. For example, Kathy Charmaz (2002, 2006) approaches grounded theory from a different perspective, suggesting:

The constructivist approach places priority on the phenomena of study and sees both data and analysis as created from the shared experiences of researcher and participants and the researchers relationship with the participants (2002, p. 677).

Charmaz’s approach reflects the constructivist and interpretivist perspectives within this study and acknowledges that the researcher and the “object of investigation” are responsively connected (Guba & Lincoln, 1994, p. 116). This approach implies “that the ‘findings’ are literally created as the investigator proceeds” (ibid.) and suggests that researchers are the prime instrument of data collection (Crowson, 1993; Kvale, 1996; Patton, 2002). In the role of interviewer, intuitive, reflection-in-action type researchers will “observe,
This kind of inquiry empowers researchers to search for understanding but also to reflect upon it within their own context. For example, grounded theory methodology “explicitly provides an interpretive portrayal of the studied world, not an exact picture of it” (Charmaz, p. 678). So a qualitative approach using principles of grounded theory allows me, as the researcher, to intuitively reflect and interpret meanings obtained directly from the data, as opposed to imposing meanings obtained from the literature, for example, on the data. This approach to the research enables me to gain an understanding of the different experiences and meanings of design and of sustainability that originate from the participants; that is, they are grounded in the participants’ experiences.

**Principles of a Case Study Approach**

A grounded theory methodology is the basis of the research design. The participants in the study were ‘designers’, whether practicing, studying or teaching, hence the group of designers is reduced, for the purposes of the study, into four sample groups. Further details of these sample groups of designers are given in the next section (Research Methods). The different contextual conditions associated with each sample group, and the variations in focus on sustainability, suggested a comparative case study approach.

A case study approach comprises more than the techniques and procedures used to compare and contrast contextual cases. It encompasses methodological assumptions and the techniques and procedures for sourcing, gathering, and analysing data (Flyvbjerg, 2006; Freebody, 2003; Patton, 2002; Sarantakos, 2005; Yin, 1994). From this view, “[a] case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (Yin, 1994, p. 13). Thus, the case study approach can be adopted with the intention of influencing or improving policies or procedures (Freebody, 2003), or bridging design theory and practice (Breslin & Buchanan, 2008) through a deeper understanding of the case and the interrelated context being studied. This latter notion is key for design research, as quite often the boundary between theory and practice is blurred (Dilnot, 1982, 1984b). Such cases have the potential to play an important role for design research through pragmatically addressing theoretical knowledge. Therefore, a case study methodology provides both the context and the detail of multiple cases and a more grounded understanding of the complexity of interactions.

**The Use of Qualitative Interviews**

The interview is often seen as a technique for collecting data, yet as with case studies, the qualitative interview approach is holistic and incorporates a particular way of thinking for the researcher. In this perspective the “interview is literally an *interview*, an interchange
of views” (Kvale, 1996, p. 14) [emphasis in original] as opposed to a method of data collection (for example, see Crotty, 1998; Sarantakos, 2005).

Therefore, the qualitative interview approach, in the tradition of grounded theory, is a comprehensive investigation that achieves insights into aspects of life and social experiences that construct the participants’ worldview. The researcher is the prime instrument of data collection, although the emphasis is on capturing the experiences and meanings of the participants in their own words and in their own situations (Charmaz, 2002; Freebody, 2003; Holstein & Gubrium, 2004; Kvale, 1996; Minichiello et al., 1990; Patton, 2002). Thus, the two predominant aspects of qualitative interviewing are: “first-order conceptions [which] are participants’ notions about what is happening, and the second-order conceptions [which] are the researchers’ interpretations” (Crowson, 1993, p. 182). Furthermore, interviews are not collected but co-authored between the researcher and the participant (Kvale, 1996), where “respondents are not so much repositories of knowledge – treasurers of information awaiting excavation – as they are constructors of knowledge in association with interviewers” (Holstein & Gubrium, 2004, p. 141). So the aim of qualitative interviewing is to build a whole picture, from the participants’ perspectives, acknowledging interpretations and the construction of the hypotheses by the researcher.

The qualitative interview approach used within this study was a semi-structured, in-depth interview with open-ended questions. In semi-structured interviewing a set of questions, delineating topics and questions, guides the researcher to elicit accounts and meanings, yet also allows freedom to follow subsidiary conversations (Freebody, 2003). This method of gathering data from a real life, interpersonal situation, is based on a purposeful conversation between two people around a common theme (Holstein & Gubrium, 2004; Kvale, 1996; Minichiello et al., 1990). It is important to recognise the influential role of the researcher within a face-to-face interview setting. In this view, “interviewers are deeply and unavoidably implicated in creating meanings that ostensibly reside within respondents” (Holstein & Gubrium, 2004, p. 141). Therefore, in this situation I am the interviewer, and:

...ha[ve] an empathic access to the world of the interviewee; the interviewee’s lived meanings may be immediately accessible in the situation, communicated not only in words, but by tone of voice, expressions, and gestures in the natural flow of a conversation (Kvale, 1996, p. 125).

As the researcher, I am situated in a positive relationship with the participant through a “face-to-face encounter” (Minichiello et al., 1990, p. 93). This personal rapport facilitates gathering inherent meanings of experiences from participants not only through their own language but also tones, expressions and gestures. So the experience of the interview itself not only provides me with a wealth of data but also potentially augments my participants’ construction of their own knowledge through articulation and discussion in the inter-view.
Involving an appropriate number of participants enhances my understandings and enables a valid comparative analysis of the data (Freebody, 2003). Steiner Kvale observed that some researchers suggest “qualitative interviews do not test hypotheses, they are only explorative and thus not scientific” (1996, p. 288). Nevertheless, Kvale argues that interviews can be used in a scientific manner, and Charmaz suggests “[o]btaining rich data provides a solid foundation for developing robust theories” (2002, p. 677). In short, the use of qualitative interviews with a broad range of participants provides the solid foundation of rich data, which enables shared knowledge to be formulated between my participants and myself in order to develop my theories.

**Trustworthiness and Authenticity**

The use of qualitative approaches raises questions regarding how objective or subjective a researcher is when ‘constructing’ research outcomes. In qualitative methodologies the researcher participates in interpreting and constructing realities; a notion that suggests that the results are the subjective interpretations of the individual seeking objective knowledge within a socially constructed reality (Crowson, 1993; Patton, 2002; Wolcott, 1993). Acknowledging my position as the primary instrument of data collection within the design of this research study implies that I will assume an insider perspective. This emic approach within research, as opposed to the etic (outsider) approach, can be faulted for requiring too much familiarity with a situation, potentially leading to the overlooking of important but minute, everyday details (Crowson, 1993; Patton, 2002). Both insider and outsider perspectives are value-laden and implicated within the objective-subjective debate. These debates within qualitative research are extensive (for example, see Barone, 1992; Eisner, 1992; Eisner, 1998; Guba & Lincoln, 1994; Phillips, 1990; Popper, 1972).

The value-based context of the study cannot be overlooked. I do need to address the issues of “how to get beyond the extremes of a subjective relativism where everything can mean everything, and an absolutist quest for the one and only true, objective meaning” (Kvale, 1996, p. 229). Therefore, the intention of this study is to achieve “trustworthiness and authenticity,” through seeking “empathetic neutrality” (Patton, 2002, p. 51) [emphasis in original]. In other words, I minimise the potential for subjectivity and am as objective as possible under the circumstances. In order to achieve this objectivity within my study, tensions must be clarified (through honesty in the Personal Context section) and methodologies must be justified (explained in detail in the next section), and as situations arise the context and multiple perspectives must be truly appreciated. Also I must be able to understand the experiences, meanings, and worldviews of my participants (Crowson, 1993; Maykut & Morehouse, 1994; Patton, 2002; Sarantakos, 2005). The disclosure of my positionality and my theoretical and methodological assumptions that could bias my interpretations are one attempt to increase my awareness of these issues.
In this research triangulation of the methods, sources, and analyses was employed to give the results trustworthiness and rigor. Triangulation refers to the practice of strengthening a study through employing various research tools within the same research design and can be exercised at different stages of the research (Freebody, 2003; Minichiello et al., 1990; Patton, 2002; Sarantakos, 2005). Thus within this study, a qualitative interview approach and a case study methodology were both adopted. These two approaches were underpinned by the inductive analysis of a pragmatic grounded theory (see D. R. Thomas, 2006) allowing a multiple-case comparison of the data, which is described in detail in the last section of this chapter (Data Analysis). Documentary sources, such as prospectuses, online information, course guides, course planners, and published documents, provided an additional source of data and were used to strengthen the case studies in terms of how participants include sustainability in the teaching and practice of design.

Research Method:

Purposeful Sampling and Interview Process

This section focuses on research methods for gathering data. In particular, I explore the purposeful sampling of participants, ethical practice, and the interview procedure.

Purposeful Sampling of Participants

Within quantitative research, random sampling of participants provides a representation of the population under study. Within a grounded theory approach a researcher begins with initial or purposeful sampling and, as the spiral of analysis tightens, moves into theoretical sampling until reaching saturation (Charmaz, 2006). Charmaz asserts that “[c]olleagues and teachers who invoke the logic of quantitative research often mistakenly advise qualitative researchers to make their samples represent distributions of larger populations,” in this way assuming the generalisability of a qualitative study. Charmaz continues to suggest that following a representative strategy to data collection may be useful but according to principles of grounded theory, it can result in the collection of “unnecessary and conceptually thin data” (ibid.).

In contrast, many qualitative researchers utilise alternative sampling methods. Michael Patton, for example, argues that the “logic and power of purposeful sampling derive from the emphasis on in-depth understanding” (2002, p. 46). Pamela Maykut and Richard Morehouse suggest purposeful sampling “increases the likelihood that variability common in any social phenomenon will be represented in the data” (1994, p. 45). In this view, purposeful sampling provides the researcher with “information-rich” participants (Patton, 2002, p. 46) that allow a better exploration of significant issues associated with the problem. Information-rich participants provide an opportunity to assimilate issues of importance across the field of research. In this study, purposeful sampling facilitated a deep
understanding of particular situations – specifically, a focus on the obstacles and opportunities associated with implementing sustainability within the teaching and practice of design. I have endeavoured to be as rigorous as possible in locating and extracting information-rich data from a wide range of informative participants.

All of the participants in this study are designers. As previously stated, these are individuals connected to the discipline of design, whether through a tertiary education system or a design practice. They were chosen to form four sample groups of designers:

1. Experts: Design academics who are actively researching, publishing, and including sustainability and design, within a university, from five other countries;
2. Teachers: Design teachers, researchers, and non-researchers, from three universities or polytechnics within Aotearoa;
3. Students: Design students from two universities or polytechnics within Aotearoa, studying under the aforementioned teachers;
4. Practitioners: Design practitioners from two design businesses within Aotearoa.

I distinguished these groups as separate sample groups of designers because of the differences in their various circumstances (for example, international experts and national teachers, students and practitioners) and their connections to the discipline of design. Semi-structured, in-depth interviews with a number of open-ended questions were conducted with sixty-four participants from these four sample groups of designers, (see Table 3.5).

Table 3.5.

<table>
<thead>
<tr>
<th>Sample group:</th>
<th>Experts</th>
<th>Teachers</th>
<th>Students</th>
<th>Practitioners</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of designers</td>
<td>15 designers</td>
<td>15 designers</td>
<td>19 designers</td>
<td>15 designers</td>
<td>64</td>
</tr>
<tr>
<td>Number of institutions</td>
<td>8 international universities (five countries)</td>
<td>3 national institutions</td>
<td>From 2 (of the 3) national institutions</td>
<td>2 national businesses</td>
<td>13</td>
</tr>
<tr>
<td>Total number of interviews</td>
<td>15 interviews</td>
<td>15 interviews</td>
<td>31 interviews (12 designers interviewed twice)</td>
<td>15 interviews</td>
<td>76</td>
</tr>
</tbody>
</table>

Table 3.5 shows how seventy-six interviews were gathered from the sixty-four designers and how these are distributed across the four sample groups of designers. Further details regarding each group are given below.

Experts: International design academics

The sample group of international academics were classed as experts within this study because of the recognition accorded their work in tertiary education of environmental issues or notions of sustainability in the discipline of design. The group of experts were selected in two different ways. The first group were academics, purposefully chosen due to
their publications in the discipline of sustainability and design. The second group were selected using a snowballing technique. That is, the first group of experts recommended other academics also researching and teaching in a similar field (Patton, 2002; Sarantakos, 2005). This process resulted in a sample of fifteen experts, who are academics from three different design-based disciplines: product/industrial design, engineering design, and architectural design. Importantly, these designers intentionally include environmental or socially sustainable issues in their teaching of design.

The sample comprises eight academics from two universities in the United States; one academic from Canada; four from three universities in the United Kingdom; one in Denmark, and one in Italy. These fifteen academics range from having a lifetime interest in sustainability, and actively promoting sustainability, to having a relatively short experience (three years) in researching sustainability and including it in the discipline of design. All of these designers had either written books, educational guidelines, journal articles, theses, or conference papers on design and sustainability; they had either participated in establishing a sustainable programme or course within their institution, founded discussion wiki’s or websites that debated issues of sustainability within design, and some, alongside their teaching, had their own design practice consulting in sustainability.

The international academic experts on design and sustainability were invited to participate in a face-to-face, semi-structured, in-depth, confidential interview. These interviews were conducted during a four-month period from the beginning of March 2007 to the beginning of July 2007.

**Teachers: National design teachers**

The national design teachers were from universities or polytechnics within New Zealand. There are six universities or polytechnics that teach product or industrial design as a three or four year degree course or programme in the nation. One of the six was in its inaugural year at the time of the study and had only one full-time member of staff. Three of the remaining five accepted the invitation to participate in the study. All of the teachers in the design departments within these three universities or polytechnics were selected making a total of fifteen national design teachers.

It is important to note that while all of the design teachers were salaried members of staff that had a role in educating design students, no distinctions were made between research and non-research positions. The majority of these national design teachers were practicing designers, a few of which have their own businesses outside of the university or polytechnic. Some of the teachers had experience with sustainability and design that was known prior to the study, alternatively others were revealed as being involved with sustainability and design during the study. Four members of this group have previously researched (and some have published papers) in the field of sustainability and design (or a
similar terminology), while one has a design practice focusing on the subject. These national design teachers were invited to participate in a face-to-face, semi-structured, in-depth, confidential interview. The interviews were conducted during a two-month period from the beginning of August 2008 to the end of September 2008.

**Students: National design students**

The sample of national design students was generated from the two national tertiary institutions, previously indicated above. The sampling process used in the two institutions differed due to the differences in access, the design courses, and the number of students available. In the first institution, second-year design students were required by their teacher to undertake a project that introduced them to issues of design and sustainability. Using this approach, the teacher intentionally made sustainability an explicit aspect of the project. The nature of the particular project was designed to be susceptible to sustainability (for example, to design a light: a project where renewable energy could easily be included).

Approximately forty second-year students were enrolled in the course, so a snowballing sampling technique was chosen. The design teachers (who were also participants in the research) in charge of the project recommended the first five students due to the direction their projects had taken by the third week (for instance, they were already conceptualising ideas that had sustainable tendencies). These five students were interviewed in the third week of their project; the same five students were also interviewed at the end of the project. At the end of the project, I was invited to attend the students’ presentations during which I identified other potential participants for the study. The students were purposefully selected due to the sustainable nature of their projects. A total of eleven design students were selected and interviewed specifically because notions of sustainability were recognisable in their projects. During the interview it was clear that some of the students were unaware that they had created sustainable products. The students were invited to participate in a face-to-face, semi-structured, in-depth, confidential interview. The interviews were conducted during a four-month period from the beginning of August 2008 to the end of November 2008.

National design students from the second institution were chosen using a different method. I was invited by a staff member (also participating in the research) to attend a specific ‘Life-cycle Thinking’ workshop halfway through the semester, and in the middle of the second-year design students’ projects. Students were selected to attend two interviews, one prior to the workshop and one directly afterwards using a random sampling technique. A brief questionnaire (written on surveymonkey.com) was sent out, via the staff member, to all forty, second-year students inviting them to participate. Of the twelve responses only seven were willing to be interviewed, and these seven were included in the sample. From the results of the brief questionnaire it was clear that some of the students were familiar with sustainability and design, others were not; both were chosen for the interview. The students
Practitioners: National design practitioners

The group of national design practitioners were industrial/product design staff members from two well-established national businesses; both of which have a specific design department. The two businesses were specifically selected because of my prior understanding of the businesses’ stance on environmental issues. One business incorporates sustainability in their philosophy and holds an ‘Environmental Choice’ certification; they employ a specific sustainability champion and sponsor a researcher focusing on sustainable issues from a nearby institution. The second design business is larger than the first and has no specific connection to sustainability. Within the two businesses all of the design staff and their design manager were included in the sample. A total of fifteen national design practitioners were interviewed. Some of these fifteen people were known to have experience with design and sustainability prior to the interviews (the sustainability champion and researcher, for example), while others’ experiences became apparent during my interview with them. In the first business, only the sustainability champion and researcher had previous experience in sustainability; in the second, larger business, no designers had such previous experience. These practitioners were invited to participate in a face-to-face, semi-structured, in-depth, confidential interview. Interviews were conducted during a three-month period from the beginning of July 2008 to the end of September 2008.

Ethical Practice

This study was reviewed and given ethical approval by Te Iho Whenua, the Department of Geography, at the Te Whare Wananga o Otago, University of Otago, Aotearoa on the 26th February 2007. All participants were fully informed of the nature of the project and gave their informed consent. Given the size of Aotearoa and the small population from which the samples were drawn, every attempt is made to protect the anonymity of the participants. Ethical approval was also required and granted by two of the participating institutions. Documents pertaining to ethics are included as Appendix A.

Research Delimitations

The delimitations of the research revolve around the sample groups of designers that were interviewed. Specifically, I was restricted in the number of institutions I was able to afford to visit, both financially and due to time limitations. I also had to bound the research and as such four groups of designers were specifically chosen, importantly only the expert group has an international context. I am very aware that had I been able to include teachers, students and practitioners from overseas similar issues that are identified throughout this
thesis may well have also been drawn out. Therefore, I must clarify that it is not the New Zealand context itself that generates these results, so perhaps it is more of a commentary on ‘non (research-focused) expert’ perceptions of design and sustainability that frame certain perspectives on designing for sustainability, whatever the geographical context.

In addition within New Zealand, two of the six higher educational design departments did not want to participate in the study; a further department was in its first year and were inexperienced to participate. A fourth department allowed access to the teachers but withdrew halfway through; meaning access was not granted for those students.

**Interview Process**

The interview protocol differed slightly between the experts and the remaining three sample groups; one difference was the order in which the second set of questions were asked, another was in the terminologies used. Both of these differences are expanded upon below. All of the interviews included a series of key open-ended questions, also described below. Open-ended questions were used to optimise the participants’ responses using their own (and not guided) language (Kvale, 1996; Minichiello et al., 1990; Patton, 2002). The semi-structured nature of the interviews allowed designers’ responses to be explored further as required. For this study, the first set of open-ended questions for the interviews were:

**Introductory (first) set of questions:** What do you do? How do you do that? Why are you doing that?

These broad questions allowed each of the four groups of designers to use the words or terminologies they were most comfortable with, and then describe their role within the university, polytechnic or business in which they worked or studied. The second set of open-ended questions was more specific with the aim of drawing out the meanings and experiences of designers regarding: design, sustainability, and sustainable design. The following examples formed the outline for the questions, and the aforementioned terms were slotted into the brackets:

**Principal (second) set of questions:** What does [...] mean to you? How are you achieving this? Why are you doing this?

It is important to note that due to the underlying epistemology of design, when the four sample groups of designers individually described their understandings of ‘sustainability’ they often referred to sustainability within the context of design. Therefore, as previously indicated, for the findings chapters (Chapters four to seven), the word ‘sustainability’ refers to concepts of sustainability defined within the design, unless otherwise stated.

Moreover, depending on the participants’ answers, the questions were intersected or followed up with appropriate probing questions to clarify and/or gain a deeper understanding of particular responses. Examples of the probing questions used were:
Probing questions: What did you mean by that? How did you go about that? Can you tell me more about that? Can you explain that? Can you give me an example of that? Can you be more specific there? Why did you think that?

The main difference between the interview protocol for the experts and the other three sample groups is the order of the second set of questions. For the experts the reverse order of sustainable design, sustainability, and design was assumed. This change in ordering was due to the assumption that the three national sample groups might be less familiar with sustainability, in this way starting with questions about the meaning of design was more appropriate in helping them feel more comfortable in the interview.

The interview protocols for the experts and the remaining groups also differed in the second set of interview questions. When the experts responded to the first set of questions, I used their terminology to slot into the brackets, so for example, if they focused more on environmental design then the question became “What does environmental design mean to you?” Although, at the end of each of the experts’ interviews were a list of terminologies that I specifically asked them to explain, especially if they had not expanded on the words sustainability or sustainable design. This lack of explanation, however, was quite rare, as most of the experts focused on sustainability and not environmental design. For the other three sample groups, identical words of design, sustainability, and sustainable design were used.

Further questions were asked of the four sample groups about the obstacles and opportunities to including sustainability in the discipline of design that existed or were anticipated within their university, polytechnic, or business. In some cases the conversation moved towards specific influences for the participant, while in others the focus was on explaining specific terminologies, such as ecological design, green design, and design for environment. This variation in response provided information-rich data regarding participants’ meaning of design, sustainability, and sustainable design and their implementation within their institution. An example of the interview schedule is attached as Appendix B.

All seventy-six interviews were recorded (twelve students were interviewed twice, see Table 3.5) and transcribed in full, some by myself, (the researcher) and some by a professional transcriber. In the case of the latter, each transcript was checked for accuracy against the recording. There were two instances of some loss of data. One expert suggested meeting in a café and in places his recording is unintelligible due to general background noise. In the second instance, a battery died on the recording device during another expert interview. Research notes taken at the time provided a substitute for these instances.

With the exception of eleven students from one institution, every transcript was returned to interviewees for comments, changes and alterations. In the case of the eleven students, contact was kept to a minimum as a requirement of the ethical approval. Average
interview lengths ranged from twenty minutes with the students to over an hour with two of the experts.

Data Analyses:
Pragmatic Grounded Theory with Case Studies

The analyses of data were based on principles of grounded theory and case study methodologies. This section focuses on a pragmatic grounded theory analysis, sometimes referred to as an inductive data analysis approach, which is guided by these two methodologies (previously discussed in the Research Approaches section) and influenced by the research methods, (also discussed in the previous section).

In grounded theory, the purpose of the analysis of data is the development of theories. In this study, the purpose was development of theory relating to the meaning of design, the relationship between design and sustainability, and the inclusion of sustainability in the discipline of design. Such a metamorphosis is achieved only through precise, replicable, justifiable, and analytical processes. Within qualitative analysis:

No formula exists for that transformation. Guidance, yes. But no recipe. Direction can and will be offered but the final destination remains unique for each inquirer, known only when – and if – arrived at (Patton, 2002, p. 432).

In this case, the guidance comes from the research approaches previously outlined and the nature of the data. Moreover, “grounded theory methodology leaves nothing to chance” (Glaser, 2001, p. 12), because the approach is “a tight fit” between data and analysis (Charmaz, 2002, p. 676). Therefore, practical principles of grounded theory and the comparative aspects of a case study approach build the foundations of my investigation.

The choice of inductive analysis as a strategy to construct categories and themes from the information-rich data fits within the practical principles of grounded theory methodology. David Thomas (2006) argues that general inductive analysis is a pragmatic grounded theory using analytical techniques that are consistent with other forms of qualitative research. The approach reflects elements of Glaser and Strauss’ constant comparative method, which is a “multifaceted approach to research designed to maximise flexibility and aid creative generation of theory” (Conrad, 1993, p. 280). This analytical inductive approach is used not only to “justify a theory but as a means of creating one” (Minichiello et al., 1990, p. 286) [emphasis in original]. The general inductive approach is suggested as providing an easy-to-use, “systematic set of procedures for analyzing [sic] data that can produce reliable and valid findings” (D. R. Thomas, 2006, p. 237). Therefore, the constant comparative method and inductive analysis are used to compare findings within my data.

In addition to comparing and contrasting units of data and emergent categories, the research problem and resulting questions indicate that comparison across the four
purposefully selected cases would also be beneficial. Case study methodology enables researchers to “compare and contrast interpretations” and specifically develop “matrices of categories” or “tabulating frequency of events” (Freebody, 2003, p. 83). In this view, case study methodology strengthens the mode of analysis in order to answer the research problem of understanding the role sustainability plays in the teaching and practice of design.

In summary, this study comprises a mix of analysis methods, using principles of pragmatic grounded theory: specifically, the constant comparative method, as described by Maykut and Morehouse (1994), inductive analysis, as described by Thomas (2006), and case study methodology, as described by Peter Freebody (2003). The decision to use this mix of analytical methods transpires due to my personal constructs of designerly ways of thinking, and the complexity associated with sustainability and design in research. I endeavour to investigate data as rigorously as possible, allowing the meanings and experiences of the participants to be exposed.

**Reporting of Findings**

To preserve the anonymity of the designers, the exemplar statements used to illustrate the categories are coded. The codes are specifically designed to help the reader associate the designers’ response to a particular sample group of designers. Each group of individual designer can be identified through the first letter of their pseudonym, for example (E) for ‘Expert’; (T) for ‘Teacher’; (P) for ‘Practitioner’; and, (S) for ‘Student’. For example, the academic experts in sustainability and design are coded with names such as Eric, Emily and Eve (see Table 3.8). Design teachers are coded with names such as Tom, Taz and Tane. Design practitioners are coded with names such as Pete, Polly and Pierre. Finally the design students are coded with names such as Samuel, Sabina and Sidney.

Research participants’ statements are presented as recorded, with only minor editing of redundant words. In a few instances words are inserted in square parentheses in order to provide the reader with a frame of reference, for example when the word “it” is used. I acknowledge that the exemplar statements from these interviews are being removed from their specific context; I have endeavoured to retain as much context as possible.

In summary, the four results chapters each focus on different findings. The format for each chapter is similar, the first set of categories (created from four stages of analysis) are described followed by a discussion that relates the findings to current literature. This discussion is then followed by a comparison between the sample groups of designers’ contribution to the creation of the category. Here graphs developed from the fifth stage of analysis are used as a point of discussion. The following subsection explains these five processes of analysis and the development of the diagrammatical graphs.
The Emergence of Categories Through Four Stages of Coding Analysis

In general, categorising and coding describes the method of grouping and conceptualising data. Coding is a means of disassembling and reassembling data in new and exciting ways (Charmaz, 2002; Minichiello et al., 1990). Furthermore, coding enables ideas to develop from within the data, where the researchers can develop links and derive categories and key themes, leading to the development of a theory (D. R. Thomas, 2006). So the specific task of coding is to recognise, categorise, and describe phenomena found within the data.

In this way, coding is used as a means of constructing categories with their own detailed descriptions from the data and also allowing links and themes to be distinguished. The four stages of coding used are illustrated in Figure 3.21. The diagram is based on the constant comparative method and inductive analysis.

Figure 3.21. Diagram of the coding process, based on Maykut & Morehouse (1994) and Thomas (2006)

Figure 3.21 illustrates the directional relationship between the categories and elements, and the four key stages of coding. These are (Stage 1) unitising the data (also known as initial or open coding); (Stage 2) comparing units of meaning in order to reduce the categories, (Stage 3); refining the categories (also known as selective, axial coding or focused coding) and (Stage 4) locating relationships between the elements in order to develop key categories. Each stage is explained in detail below; I justify each as I proceeded through the analysis.

Familiarisation with the data.

Prior to the first stage of coding is the familiarisation process, which allows inherent meanings within the information-rich data to be identified (D. R. Thomas, 2006). Given the large amount of data (seventy-six transcripts from sixty-four designers) familiarisation was pursued in several ways. Data generated by the experts were reproduced first, so these data were used to trial an initial analysis. This analysis was not used subsequently because a decision was taken to pool all the data (see Stage 2 below), however, the exercise proved to be an important learning experience with regard to my methodological assumptions, and in building the data analysis process. The exercise also made me very familiar with the data. As further data were collected I endeavoured to gain the same level of familiarity with each interview.
Stage 1: Unitising the data into initial categories of units of meaning.

The coding and categorising of the data began when all of the transcriptions of the interviews were complete and I was well acquainted with each. The constant comparative approach was used for the initial unitising of the data, beginning with the ascertaining of specific segments of text as units of meaning. In this process, units of meaning are searched for within the words and actions of each participant (Maykut & Morehouse, 1994). Units of meaning must stand by themselves and be understandable as a segment of text, in order to be useful for analysis; they can also be a response to a specific question, therefore the question can also be included in the segment of text.

In order to achieve this process the raw data were printed and cut into sentences or paragraphs, capturing a specific incident, process, meaning, or experience. Within this process every piece of text within the interview transcripts and observational notes were unitised. The segments of text were collated into units of meaning by attaching them to large pieces of paper under labels taken from within the segments (Thomas, 2006).

Using the constant comparative method, segments of text were constantly compared. That is to say, as the data were unitised, each segment of text was compared to all other previously grouped units of meaning. If no similar meaning existed then a new unit of meaning was formed (Maykut & Morehouse, 1994). New units of meaning were constructed as text segments were organised. In this way, text segments belonged to one or many units of meaning, and so hundreds of initial categories of units of meaning can be recognised within the participants’ data.

Stage 2: Comparing and reduce units of meaning into interim categories.

The second stage of coding involved cross comparison of the units of meaning, as relationships and connections between the meanings were sought. So the hundreds of categories of coded units of meaning were reduced and sorted into themes. This stage involved changing, amalgamating, and excluding units of meaning until interim categories began to be exposed. During this process a meaningful unit belonged to one, many, or no interim category/categories and considerable amounts of text were not allocated to any category due to their irrelevance to the overall objectives of the study (see D. R. Thomas, 2006). I initially tried unitising data (stage one) by analysing separate sample groups, however, this separation made it increasingly difficult to compare and contrast the findings and so limited the potential of data. A more appropriate approach was to pool the data from all four groups and analyse all the transcripts together in order to draw out categories relevant to all of the designers.

The process involved rearranging the units of meaning, searching for overlaps, relationships and connections using the “looks like” or “feels like” criteria (Maykut &
Morehouse, 1994, p. 136). Here, each unit of meaning was considered individually and a decision made as to whether it looked/felt like other units within an interim category or whether it formed an interim category on its own. This systematic process was carried out on reams of paper, strung across walls, where large sheets of paper were filled with the units of meaning as they were organised into the interim categories. Labels for these categories were determined from within the units of meaning. When approximately six to eight units of meaning were organised into one interim category, rules for the category were defined in order to start refining the categories (see details in the third stage). Through this second stage the hundreds of coded units of meaning were reduced into thirty to forty interim categories.

Stage 3: Refining categories and writing rules of inclusion.

The third stage of the process was the further refinement and revision of the interim categories, which allowed new insights and subtopics to materialise. Prior to the third stage, the interim categories had been constructed through the look/feel like criteria, so this subsequent stage in the process fine-tuned the categories through the development of “rules of inclusion” (Maykut & Morehouse, 1994, p. 139).

Rules for inclusion were “inductively derived from the properties or characteristics” of the interim categories (ibid., p. 142). Thomas (2006) argues that as propositional rules are created further overlaps between interim categories, revelations and contradictory points can be discerned. Such “propositions are the roughly formed outcomes” of the study, although at this interim stage they lack coherence (Maykut & Morehouse, 1994, p. 143). Stage three resulted in fifteen to twenty refined categories, which for the remainder of the thesis, are referred to as elements that inform the key categories.

Stage 4: Locating relationships between elements to create key categories.

The last stage of the coding process was the location of patterns and relationships between the elements to facilitate the creation of key categories. Thomas asserts that the “intended outcome of this process is to create a small number of summary categories” that “capture the key aspects of the [most relevant] themes identified in the raw data” (2006, p. 242). In order to achieve this outcome, the propositional rules, defined for each category were examined in detail to locate connections, hierarchies and patterns between each element, thus defining three to eight key categories of the study (and their interrelated elements, described above).

An example of the emergence of one category from the data.

This research presents four findings chapters, each guided by different research questions. The four stages of analysis, described above, constitute the process of
transforming the information-rich data into the key categories for each research question. For example, the first findings chapter (Chapter four) focuses on the first research question:

What are the commonalities and differences in meanings of design and sustainability for different groups of designers (international experts and Aotearoa-based teachers, students and practitioners)?

The four stages of analysis, described above, create three key hierarchical categories for both design and sustainability. To illustrate, Table 3.6 in combination with Figure 3.22 (overleaf) shows these four stages that derive the first category, A: Design is about the designed outcome. Each stage of the process is coded for ease of reference (Table 3.6).

Table 3.6.

Table of Codes, Showing Initial Coding, Revision of Coding, Interrelated Elements and Category A

<table>
<thead>
<tr>
<th>Initial Codes</th>
<th>Units of Meaning (illustrated as circles):</th>
<th>Revised Codes</th>
<th>Interim Categories (illustrated as pentagons):</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD</td>
<td>...hard development</td>
<td>PD</td>
<td>...product development</td>
</tr>
<tr>
<td>CSR</td>
<td>...converting solutions to reality</td>
<td>TT</td>
<td>...tangible things</td>
</tr>
<tr>
<td>P</td>
<td>...products</td>
<td>Fo</td>
<td>...form</td>
</tr>
<tr>
<td>MS</td>
<td>...material selection</td>
<td>Fu</td>
<td>...function</td>
</tr>
<tr>
<td>MNT</td>
<td>...make new things</td>
<td>NJP</td>
<td>...not just products</td>
</tr>
<tr>
<td>CT</td>
<td>...creating things</td>
<td>Pe</td>
<td>...people</td>
</tr>
<tr>
<td>MTB</td>
<td>...making things better</td>
<td>SS</td>
<td>...services or systems</td>
</tr>
<tr>
<td>FT</td>
<td>...follow trends</td>
<td>Elements (illustrated as rectangles):</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>...ergonomics</td>
<td>A (i)</td>
<td>Design is about something tangible</td>
</tr>
<tr>
<td>MTP</td>
<td>...more than just making products</td>
<td>A (ii)</td>
<td>Design is about the form or function of objects or services</td>
</tr>
<tr>
<td>SNF</td>
<td>...seeing a need and filling it</td>
<td>A (iii)</td>
<td>The designed outcome is for the user</td>
</tr>
<tr>
<td>OS</td>
<td>...objects and services</td>
<td>Category (illustrated as diamonds):</td>
<td></td>
</tr>
<tr>
<td>BFU</td>
<td>...being better for user</td>
<td>A</td>
<td>Design is about the designed outcome</td>
</tr>
</tbody>
</table>

These codes underpin the diagram in Figure 3.22 and are labelled from within the data for ease of reference. For example, two units of meaning stemming from the data can be summarised as ‘design is about hard development’ and coded HD or ‘design is about converting solutions to reality’ and coded CSR. Both of these units of meaning are shown in the diagram as circles in Figure 3.22. Thirteen initial units of meaning are obtained from data, which when compared can be distributed into seven interim categories (shown as pentagons in Figure 3.22). HD is only about the development of a product, thus it is organised into the interim category of ‘design is about product development’ (coded PD). CSR relates to both ‘design is about product development’ and ‘design is about tangible things’ (coded TT). These seven interim categories are refined into the three elements
(shown as rectangles in Figure 3.22). For example, ‘design is about product development’ and ‘design is about tangible things’ are closely linked and can be organised into the first element of ‘design is about developing something tangible’ (coded A (i)). Thus, elements are interrelated and create the key category (shown as a diamond in Figure 3.22), which, in this example, can be defined as A: Design is about the designed outcome.

Figure 3.22. An example of analytical processes used in development of Category A (n = 64)

Figure 3.22, therefore, shows how information-rich data (n = 64) is unitised into thirteen ‘units of meaning’ (circles), which are reduced through the comparison stage into seven ‘interim categories’ (pentagons). In turn, these were refined into three interrelated ‘elements’ (rectangles) and then relationships between each were connected to create one key ‘category’ (diamond). Using these stages of coding, three categories describing the meaning of design (A, B, C) and their interrelated elements (i, ii, iii) emerged, as shown in Figure 3.23.

Figure 3.23. Diagram of the coding process to form three categories (A, B, C)
These four stages of coding and analyses were used to construct the three key categories of meaning (A-C) described in Chapter four. Due to the nature of their emergence, they are not mutually exclusive categories (as Figure 3.23 shows). In order to provide a more in depth understanding of the categories, three interrelated elements further elaborate each. For instance, and coincidentally, the word ‘design’ has three interrelated elements for each category, shown in Table 3.7.

Table 3.7.

Example of Interrelated Elements for the Three Categories of Design (as indicated in Table 4.13. Three Elements Create each Category of Design)

<table>
<thead>
<tr>
<th>A: Design is about the designed outcome:</th>
<th>B: Design is about the activity of designing:</th>
<th>C: Design is about a way of thinking and reasoning:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Design is about developing something tangible</td>
<td>(i) Design is about the creative activity of designing</td>
<td>(i) Design is about being critical and reflective</td>
</tr>
<tr>
<td>(ii) Design is about the form or function of objects or services</td>
<td>(ii) Design is about problem solving through designing</td>
<td>(ii) Design is about asking questions and making connections</td>
</tr>
<tr>
<td>(iii) The designed outcome is for the user</td>
<td>(iii) Design is about being able to communicate</td>
<td>(iii) Design is about collaborative thinking that benefits communities</td>
</tr>
</tbody>
</table>

These nine elements, established through the three stages of analysis and together with the fourth stage enable relationships to be located between the elements to create the three key categories. Similar processes were used to construct the three key categories of meaning for sustainability, also described in Chapter four (X-Z), the four categories of approaches described in Chapter five (1-4), the five categories of drivers that lead to the inclusion of sustainability in Chapter six (I-V), and finally the four categories of barriers created in Chapter seven (a-d). A final and fifth process of analysis was used to compare and contrast the categories and their interrelated elements, between the four sample groups of designers. The findings from this fifth stage of analysis are discussed in each of the findings chapter (Chapters four to seven) and concluded in Chapter eight.

Stage 5: Comparison of cases in order to answer the research questions.

The final process of the analysis process involved comparing and contrasting interpretations from the four sample groups of designers to identify the variations between each. Here, analysis is essential in determining whether the four sample groups of designers understand design and sustainability identically or disparately. These distinct meanings become the foundation for the findings, and the conclusion that how sustainability becomes incorporated into the discipline of design depends upon what it is the teachers and practitioners originally understand.

To facilitate these comparisons exemplar statements from individual participants (those used to described each category and interrelated elements in each chapter) are collated
to create comparable bar charts. In order to explain this process in more detail the first category (A) is used as an example. After the third stage of the constant comparison process three interrelated elements of meaning are established. Each one is distinctly different enough from each other to formulate an element, yet similar enough to be part of the same category. These three elements create a category, and subsequently three categories of meaning are obtained that described ‘design’. Exemplar statements from the four sample groups of designers are used to illustrate the category and its elements. Thus collating the names of the contributors of the exemplar statements into a table provides a basis for comparison, see Table 3.8.

Table 3.8.

*Example Table Created from Expert’s Understanding of Design*

<table>
<thead>
<tr>
<th>Design:</th>
<th>A: Outcome</th>
<th>B: Activity</th>
<th>C: Thinking and Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Included in Introduction</td>
<td>Evan, Edmond</td>
<td>Edmond, Elizabeth, Evan</td>
<td>Elizabeth, Emily, Edmond</td>
</tr>
<tr>
<td>First element</td>
<td>Ernie, Elizabeth, Edmond, Earl, Elaine</td>
<td>-</td>
<td>Eugene, Eric, Elizabeth</td>
</tr>
<tr>
<td>Second element</td>
<td>Eddie, Elliot</td>
<td>Ernie</td>
<td>Elaine, Eric, Evan, Ernie</td>
</tr>
<tr>
<td>Third element</td>
<td>Emily</td>
<td>Evan, Ernie</td>
<td>Elliot, Evan</td>
</tr>
<tr>
<td>Totals:</td>
<td>10</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

Each contributing exemplar statement for the introduction of the category, and the three different elements are counted. Due to each element being distinctly different, each contribution is accounted for; meaning one individual may be counted twice if they contribute to different elements. For instance, in the introduction of category A: Design is about the designed outcome, Edmond’s exemplar statement that design is about creating a “tangible outcome” is distinctly different but related to the assertion that design can be the creation of “an artefact,” which is also a tangible outcome, however a tangible outcome can also be a service. Thus, Edmond is counted twice. Through this process of counting exemplar statements a comparison across the four sample groups of designers can be made. Table 3.9 shows the numbers or exemplar statements representing categories A to C, from the experts, teachers, students and practitioners.

Table 3.9.

*Counting Exemplar Statements from the Sample Groups of Designers for Categories A-C*

<table>
<thead>
<tr>
<th>Design:</th>
<th>Expert</th>
<th>Teacher</th>
<th>Student</th>
<th>Practitioner</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Outcome</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>B: Activity</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>C: Thinking</td>
<td>12</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>
Data from this table creates the legend for the first of the comparative, diagrammatical graphs, illustrated in Figure 3.24.

![Diagram](image)

*Figure 3.24. Example of diagrammatical graph, taken from Chapter four, (Figure 4.26. Diagram showing variations in understanding design from the sample groups of designers)*

In this way, information from the tables can be succinctly and graphically shown which enables patterns to be discerned. These bar charts are used as the basis for comparison and discussion at the end of the description of categories and are not meant to be statistical data. The categories are grouped together to best represent particular characteristics of each chapter, thus forming seven diagrammatical graphs as specified in the following table (Table 3.10).

Table 3.10.

### Seven Groupings of Categories Form Seven Tables of Data, Forming Seven Diagrammatical Graphs

<table>
<thead>
<tr>
<th>Chapter:</th>
<th>Chapter Four</th>
<th>Chapter Five</th>
<th>Chapter Six</th>
<th>Chapter Seven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic:</td>
<td>Meanings</td>
<td>Approaches</td>
<td>Drivers</td>
<td>Barriers</td>
</tr>
<tr>
<td>Categories:</td>
<td>A-C</td>
<td>X-Z</td>
<td>1 &amp; 2</td>
<td>3 &amp; 4</td>
</tr>
<tr>
<td>Number of graph:</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Figure label of graph:</td>
<td>4.26</td>
<td>4.27</td>
<td>5.29</td>
<td>5.30</td>
</tr>
</tbody>
</table>

In this way variations between the sample groups of designers and their contributions to the categories provide a comparison between meanings of design and of sustainability (Chapter four), how sustainability is currently being integrated into the discipline of design (Chapter five), and distinct drivers (Chapter six) and barriers (Chapter seven) to this integration. Each chapter encompasses a discussion section and Chapter eight draws on the key themes emerging from these findings to synthesise, discuss, conclude and make recommendations.

In summary, what is understood by sustainability and how it is currently being included in the teaching and practice of design in New Zealand can be postulated. Moreover, lessons can be learnt from the characteristics emerging from the sample group of
experts, leading to recommendations for the future integration of sustainability into the discipline of design.

**Summary and Conclusions**

Through acknowledging my background as a designer and as a tertiary teacher, and with constructivist and interpretivist assumptions grounded in sustainability, my specific research aims and objectives were discerned and verified through a gap perceived during a review of the literature. Thus developing the research problem, and along with my theoretical assumptions, provides a specific direction for procedures in the research design. In this way I chose principles of grounded theory, a case study approach and qualitative interviews to construct and analyse data. Purposeful sampling was used to select sixty-four designers, who were interviewed using a qualitative open-ended approach. The interviews generated seventy-six transcripts, which were subjected to a rigorous five-stage inductive grounded theory analysis. Figure 3.25 provides a summary of the framework of this chapter, illustrating the key stages and the directional relationships, definitions, and meanings that underpinned the research.

![Figure 3.25. Diagram indicating the constructions of knowledge, meanings and processes guiding the methodological framework for the research](image)

Figure 3.25 shows the six interconnected sections of this chapter, originally illustrated in Figure 3.19, and now includes detailed labels indicating my personal understandings, assumptions, and decisions in relation to the study. In summary, the study is based on pragmatic grounded theory and comparative case studies; an approach that was informed by my personal experiences as a professional designer; relevant literature; and the nature of the data generated from participating designers.

My data provides a variety of understandings and methods of how sustainability can be incorporated in the teaching and practice of design. My own understanding of sustainability and its relationship to design has changed considerably due to progressive
academics whose literature I have reviewed and the experts who shared their ideas, also due
to my arriving at new interpretations and insights in the course of this study. Accordingly,
the next chapter is the first of four chapters of results, and considers the variations in
meaning of design and sustainability, which subsequently underpin the remaining chapters.
CHAPTER FOUR

RESULTS: VARIATIONS IN DESIGNERS’ MEANINGS OF DESIGN AND SUSTAINABILITY

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GLOSSARY OF TERMS

Terms Used by the Participants
in Relation to Educational Institutions

Course = sections that make up a degree, often a course is a whole year, sometimes one semester, depending on the university system and/or country

Degree or degree programme = the entire three-year or four-year programme, after which a student will graduate

Lecture = information provided to students by an educator, often 1-2 hours in length

Module = part of a course, often one semester

Paper = a term for a module, common in Aotearoa/New Zealand

Programme = see ‘Degree programme’

Project = an assignment set by the teacher or coordinator of the course or programme; the length of time ranges from hours to days to weeks to a whole academic year

Semester = length of time within an academic year, often 16 – 18 weeks or equivalent to half a year

Trimester or Term = length of time within an academic year, often 14 – 16 weeks or equivalent to a third of a year
Introduction

The first two chapters explored the significant influence of design on society, the different conceptions of design, design’s role in the defuturing condition of unsustainability and positive contributions towards sustainability, through government, community, education or business initiatives in New Zealand. It was also reported how design students can be taught from a theory or practice-led programme. These key factors have guided the development of the research problem and subsequent research questions, and is further contextualised by candid discussion regarding my personal history and my theoretical assumptions in Chapter three. Underlying all four chapters (the present chapter included) is the proposition “it is crucial that we grasp what we are talking about when we use the word ‘design’” (Dilnot, 1982, p. 139). Accordingly, this chapter, the first of the results chapters, addresses the first research question, which seeks to understand whether different meanings of design influence conceptions of sustainability. Variations in meanings of design and sustainability, specifically the relationships and connections indicated by four sample groups of designers (experts, teachers, students and practitioners) are a significant focus of the chapter.

In Chapter three, specific choices regarding my research approaches were also outlined, including a systematic procedure for data gathering and analysis. As described, interview questions focus on the meaning of design, sustainability and sustainable design. A pragmatic grounded theory approach, using the constant comparative method, facilitated analysis and categorisation of data; in this way, three categories concerning meanings of design can be identified in the four sample groups of designers (A-C) and three that capture meanings of sustainability (X-Z). These six categories are detailed in Table 4.11, below:

Table 4.11.

<table>
<thead>
<tr>
<th>Design is about:</th>
<th>Sustainability is about:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: …the designed outcome</td>
<td>X: …conserving the environment</td>
</tr>
<tr>
<td>B: …the activity of designing</td>
<td>Y: …progressing economic, environmental and social performance</td>
</tr>
<tr>
<td>C: …a particular way of thinking and reasoning</td>
<td>Z: …building relationships between affected parties</td>
</tr>
</tbody>
</table>

The categories were each constructed from three interrelated elements evident though the data analysis process; they are explored separately in the next two sections. The first section is concerned with design, and the second with sustainability. Both describe the overall meanings of the respective categories, followed by in-depth explanations of the contributory elements. Exemplar statements from the participants are used to illustrate the categories and their elements.
Similarities between and across the categories are found; also clear distinctions, which define each category. A comparison of the results of the study for each of the sample groups of designers is discussed at the end of both sections, while a comparison of findings across the groups is discussed at the end of the chapter. A diagrammatical graph, towards the end of the chapter, shows the proportions of experts, teachers, students and practitioners who indicate preferences towards particular meanings (Chapter three details how these graphs were developed).

Results show discernable patterns between meanings of design and meanings of sustainability. A narrow understanding of design clearly limits thinking about sustainability, with the exception of the sample group of students who have a relatively progressive view of sustainability, despite their limited understanding of design. Findings also reveal how a more global understanding of design can lead to a more interconnected understanding of the complexities of sustainability. Identification of these specific variations in meanings of design and sustainability across and between these four sample groups of designers underpins the first three research questions. The following sections focus on the six categories, and provides material for discussions at the end of the chapter.

**Understanding Meanings of Design**

Considering the extent of existing design literature, in particular regarding the meaning of design, it is questionable why I would focus on asking the same question ‘what is design?’ It would not be unexpected that the array of meaning I received in response would be vast, and I could summarise by reiterating Micklethwaite’s conclusion that *Design means different things to different people* (2002, 2003). However, this is where our studies differ. In order to address my first research question, I intend to investigate whether different understandings of design influence understandings of sustainability and, if so, how? In this approach, asking that question, ‘what is design?’ is imperative for comprehending distinct meanings, relationships and connections from four different perspectives, namely those of: sustainable design academic experts, design teachers (some theory and some practice-based), students and company-based practicing designers. Therefore, my research on the meanings of design differs to Micklethwaite’s through our epistemological and methodological approaches. Through empirical inquiry and an interpretivist, pragmatic grounded theory analysis, specific influences, interconnections and commonalities are ascertained.

The aim of this section is to locate those commonalities or specific differences within and across the four sample groups; the results provide a foundation for comparison with the findings from the section *Understanding Meanings of Sustainability*. In this way, the variations in design create the basis for the remainder of the thesis. Accordingly, this section focuses on three distinct categories and their interrelated elements relating to the meaning of design obtained from the data. These are displayed below in Table 4.12.
Table 4.12.

**Three Elements Create each Category of Design**

<table>
<thead>
<tr>
<th>A: Design is about the designed outcome:</th>
<th>B: Design is about the activity of designing:</th>
<th>C: Design is about a way of thinking and reasoning:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Design is about developing something tangible</td>
<td>(i) Design is about the creative activity of designing</td>
<td>(i) Design is about being critical and reflective</td>
</tr>
<tr>
<td>(ii) Design is about the form or function of objects or services</td>
<td>(ii) Design is about problem solving through designing</td>
<td>(ii) Design is about asking questions and making connections</td>
</tr>
<tr>
<td>(iii) The designed outcome is for the user</td>
<td>(iii) Design is about being able to communicate</td>
<td>(iii) Design is about collaborative thinking that benefits communities</td>
</tr>
</tbody>
</table>

Coincidently, each category has three interrelated elements, which are described in detail below. The first category focuses on the realised end-result of the activity of designing, the second relates to how designers design and the third encompasses different ways of thinking about design.

**A: Design is about the Designed Outcome**

The assertion that the word design is about a product or service developed from a seed of an idea and produced by a company or an individual designer is common. For example, Evan asserts “[d]esign is the human ability to conceive, plan and realise products,” where, “conceive is the discovery, plan is the working it out and realise is the making, the craft.” Similarly, for many of the participants, the meaning of design begins with “taking a concept idea through to tangible things and giving it a form and a function and a meaning” (Peggy). Both Evan and Peggy explain how developing a product is a physical process, from conception through to production of a “tangible outcome” (Edmond). Therefore, this category is concerned with the designed outcome and Peggy’s emphasis on the appearance, performance and significance of the outcome characterises the three elements. These elements are labelled (i) developing something tangible, (ii) form or function, and (iii) the designed outcome is for the user.

**A (i) Design is about developing something tangible.**

In this case, design means developing a physical product or service: described as, “create a product” (Sol), “make” (Phelps), “manufacture” (Ernie) or “mass-produce anything” (Elizabeth), such as “an artefact” (Edmond) or “an object” (Tane). For example, Elizabeth reports “[d]esign is making plans for tangible things.” Earl explains “[t]echnically speaking design is involved when people make something,” like, “new products and furniture” (Salvador). Elaine indicates design is “[c]reating useful and beautiful things for humanity to use, equitably.” Percy and Terence imply that design is not just about the physical object, but also a service. It “can be a product or a service as well, so it doesn’t have to be a physical thing” (Percy) and design is “configuring things, objects, [and] services”
So the focus is on tangible outcomes, which include the design of services. Elaine’s comment about “useful and beautiful things” also reflects aspects of the next element.

**A (ii) Design is about the form or function of objects or services.**

For some of the participants, developing something tangible is accompanied by the importance of the “form and function” (Pauline) of the object or service. The form of an object refers to its “shape” (Paddy), while the function is how “it’s going to work” (Paolo). The meaning of form and function, however, are often interlinked. For example, Eddie discusses the importance of “thinking about all of the different attributes of the design,” he explains “the functionality, the form of it, its aesthetic appeal, whether it is ergonomic or not.” Similarly, Todd, Pete and Samantha suggest “[t]he product has to work, to function. It has to be easy to use and has to be appealing to the person” (Todd), it is something that is “aesthetically pleasing to you but on the other hand… it has to work” (Pete) and “I am function driven, so design to me is seeing a need and fulfilling it through, well, coming up with something cool” (Samantha). Todd, Pete and Samantha refer to the relationship between form and function and the physical object. Polly asserts “I like beautiful objects and not necessarily, it doesn’t necessarily have to be object, a designer object, but just beautiful things around me.” In this way, Polly has separated form from function, with the latter being less important than the former. Elliot explains the importance of form and function to a service. He argues:

In general when we design services, we design public services. For instance, elderly people are encouraged to live in their own home...[where] there is also a food service. So some students work with the central food system and they change the way [the elderly people] are provided with their meals... In some cases people like to cook their food. So...instead of providing ready-made food, the central kitchen is either providing the food as it is now [raw food], or semi-prepared food [for the] elderly people [who] have problems in preparing the raw food...they can order the food they want for the next week, depending on what they want, it is a very simple system.

In this example, the function is the food delivery service that provides food to older people, and the form is how it interfaces with the older population, determining the differing needs and wants of this group. Thus, the appearance of a designed service is as important as the appearance of a physical object. For instance, Elliot asks “how can IKEA\(^1\) represent a service so that IKEA users know what to do?” Here, Elliot is suggesting that if the appearance of the service is intuitive, then users will instinctually know how to interact with it, as in the example of the furniture company IKEA. These examples indicate how the form and function of designed result, whether a product or a service, are important aspects for the success of the outcome. For the majority of the time the two are indicated together, but for some participants, such as Polly, the two are disconnected. Designing for the user is reflected in the following element.

---

1 IKEA is a Swedish furniture company retailing flat-pack furniture; the customer constructs their own objects.
A (iii) The designed outcome is for the user.

When objects and services are the focus of design, the user of the designed outcome becomes a significant element. For instance, Pauline argues that, for her, design “means a product or service that has been well thought out in terms of the aspects that it’s aiming at in terms of user interface.” Thomas suggests “design is the method and the techniques and activities that come about to bring new visions of products and services to end users, to people, [and] for companies.” Paolo indicates “[f]or me, a lot of it’s making something better for the user” and Sandra asserts how important it is for her that “the user has a good experience while using it.” These examples all imply the importance of user considerations through the process of developing the product or service. Designing for the user is also referred to as “human factors” (Steffen) “anthropometric[s]” (Emily) or “ergonomics” (Polly). Todd reiterates design being about the user and indicates he is an “advocate of the user,” emphasising that his role is “really understanding the user and designing for that person.” He also suggests that the user has no “direct input into products, traditionally; they’re made for them.”

Summary of Design is about the Designed Outcome

Three different meanings of design are categorised together to describe the designed outcome. Here, design means creating, developing or making something tangible, whether that is a product or a service. The appearance of the product or service is significant, as is the function, especially in relation to how the user will interact with the designed outcome. The next category focuses on the activity of designing.

B: Design is about the Activity of Designing

The theme of the previous categorisation of data was the outcome, where design is a noun; however, Edmond asserts that design is “a verb and not a noun.” Elizabeth and Evan agree, arguing:

I will be the first to champion that design is a creative practice, like many things are designed. There is this kind of a forethought about framing a problem, identifying a problem and identifying potential other problems within that problem. Identifying constraints and other issues relevant to that problem (Elizabeth).

…we have tended to see the profession [of design] from a first and second order point of view. Communications and artefacts, posters and toasters! Those orders of design tend to privilege certain kinds of design practices when you move into interaction, though the designer is not always the most important person. Designers in the third and fourth orders often are designing processes and not products, the process is the product. Process meaning the way people can think about it and work (Evan).

Elizabeth suggests that “design is a creative practice” where continually distinguishing and understanding of problems is common. Evan argues that the focus of
design is moving away from the designed outcome, indicating a change from designing “posters and toasters” (referring to the professions of graphic and product design) to “designing processes.” Thus, design, as an activity, is the focus for this category, comprising the (i) creative practice, (ii) problem solving, and (iii) communication. These elements are explored below.

**B (i) Design is about the creative practice of designing.**

For many of the participants, design is a creative practice. It can be “innovative or novel” (Terry), “challenge[s the] imagination” (Thomas), or it is where we conceive “an original idea” (Sidney). For example:

Design’s a big thing. It’s not a little thing. And I think, also, one of the things designers are really good at is thinking creatively. Typically, we’re quite good at bringing other people’s research together and synthesising it to see what it means, so we can take science research and technology research and say, okay, what could they mean to people (Taylor).

Here, Taylor suggests creative thinking is inherent in designers. Similarly, Pierre asserts that design is the “combination of left and right brain thinking to solve issues, normally around solving an issue, driven by solving an issue” (Pierre). For these participants, design is about the creativity associated with designing; the last two examples also include the ability to synthesise a range of research to facilitate solving problems and creating outcomes. This latter understanding is reflected in the characteristics of the next element, concerning solving problems.

**B (ii) Design is about problem solving through designing.**

The previous element focused on being creative; the focus of this element centres on problem solving. Problems can be an assortment of issues arising for a designer and can encompass a variety of meanings, as Ernie suggests:

Designing is deciding and it is making choices about things. Often designers are very arrogant about creativity, [they think] they are the only ones who should be creative. But everyone is designing, if I am making dinner for a group of people, I am going to lay the table. I am designing the layout for the table. I think design is often pretentiously viewed a lot. But design is that activity.

In his example, Ernie argues how everyone has the ability to design and does so on a regular basis. From his point of view, the activity of designing occurs for designers and non-designers alike when they are presented with the right problem. Talbot reiterates Ernie’s expression “to design is to decide” (Ernie) by indicating design is a “decision-making process” (Talbot). Similarly, Pierre indicates that the activity of designing includes:

…developing a solution that, a product, well it doesn’t need to be a product, a solution for some specific need or some individual’s or groups’ needs and developing that in a way which has business sense and a reason to be rather than just doing for design sake.
RESULTS: VARIATION IN MEANINGS

Pierre implies that problem solving is a specific activity, for a specific purpose. In the previous example, Ernie suggests that anyone can be a designer and solve everyday problems. Both meanings convey design as a problem-solving, decision-making activity.

B (iii) Design is about being able to communicate.

Emerging from the data is how designers often work as a team when engaging in projects. In this approach, being “able to communicate effectively” (Tom) and function as a team is important. Evan explains:

…[design] students actually want a great interdisciplinary course, they connect a lot of things, providing them with the tools to make those connections is part of what we do in creating their education.

Here, Evan suggests an approach to design education that crosses different disciplines, such as teaching design communication skills to non-design students, or teaching business to design students. Ernie also refers to the importance of “multidisciplinary” work in design. In this example, Ernie refers to connecting sustainability with design issues, a concept further explored in the Understanding Meanings of Sustainability section. Nevertheless, the emphasis is on the ability to communicate across disciplines.

Similar examples are identified with some practitioners. Pauline describes the benefits of “cross-functional teamwork” and Paige suggests “communication [is] probably the most important thing.” Paddy indicates that designers “work as a team because it’s important.” He explains:

We have our own industrial design team but they have to work with… other functional teams and [on] other projects, so it’s all about communication… we’re working on so many projects at the moment, there’s a lot of, just communication decisions that need to made, trade-offs between different aspects of the design.

Paddy’s explanation focuses on the amount of communication between and across design teams and other “functional teams” (such as engineering, marketing, etc.). These data imply that being able to effectively communicate with colleagues, whether inside or outside of their disciplines or departments is essential.

Summary of Design is about the Activity of Designing

Three interrelated elements stem from the data and categorise design as a creative, decision-making activity that solves problems associated with the task of designing. Being able to communicate between and across disciplines is a relevant skill for designers in order to clearly convey concepts to clients. The following category focuses on the kind of thinking that underpins design.
C: Design is about a Way of Thinking and Reasoning

The previous two categories concern the practicalities of design. In contrast, a third and more theoretical meaning of design is noted from the data, namely a particular way of thinking and reasoning. For example, Elizabeth reports:

...for me [design] is a lot more about the internal thought processes, the thinking about thinking, the meta-cognition, the ability to monitor and adjust your decisions along the way taking into consideration all the things that will happen if you make this move or that move.

For Elizabeth, design has a deeper meaning than the outcome or the activity, and suggests it is “thinking about thinking.” Similarly, Emily explains:

Design is not just problem solving. I have a great quote from Sterling...“The achievement of greatness in art or design requires passionate virtuosity, virtuosity means thorough mastery of craft, passion is required to focus human effort to a level that transcends the moral’ [(2005, p. 129)]. You know, like that is design: passionate virtuosity. It could be anything, it could be architecture, [a] product, it could be music.

In this example, Emily acknowledges design as the designed outcome (mastery of craft), as the activity of designing (problem solving) and concludes with design as something bigger (passionate virtuosity). The previous category focused on the activity of problem solving. This category concerns the underlying notion that design is “a way of thinking” (Patrick), or “some sort of process, I guess, of thought” (Parker). For instance, Edmond argues,

I see [design] very much as a process, a process of thinking. Again it doesn’t have to be an artefact, it doesn’t have to really necessarily have a tangible outcome; it is a process. I think if you had asked me that before I had become an industrial designer I would have thought that a design was stuff that looks nice.

Edmond indicates how his perspective of design has changed from the production of a designed outcome through the activity of designing, before focusing on the “process of thinking.” The elements of Design is a way of thinking and reasoning that are communicated by the designers encompass: (i) being critical and reflective, (ii) asking deeper questions and making connections, and (iii) collaborative strategies that benefit communities of people.

C (i) Design is about being a critical and reflective thinker.

In this case, design is about critical and reflective thinking, and builds on the previous category’s element, namely, B (i) Design is about the creative practice of designing. That is to say, Pierre adds to this previous element that not only is design a creative practice, but also it involves “applying creative and lateral thinking.” In a similar way, Eugene argues that design is “assess[ing] what is needed without being told what to do,” while Eric suggests being a designer is:
Essentially to be able to ask questions of everything you look at, almost like you are choosing Descartes’ system of methodical doubt. You doubt everything that you see around you. Not just to ask what, how, why except those questions are important but also, ‘so what?’ is just so critical. I am going to design this in a certain way – so what? How will it impact, what happens when this object goes out into the world? So critical thinking to me means building a system within yourself where you are automatically sceptical of everything that you see.

In these examples, Pierre, Eugene and Eric indicate the importance of creative thinking, and continually assessing and critiquing situations, not just accepting what is presented as truth. Similarly, Elizabeth draws on Schön’s (1995) Reflective Practitioner to explain her method:

We also get them [our students] to do reflective journaling in every class... they are expected to do a one page reflection on what they have learned and to reflect on how that influences them as a student, as a professional, as an aspiring designer, so they can start making connections between explicit knowledge and turning it into a more tacit way of thinking about their design process as well.

For Elizabeth, design is a reflective practice, and she encourages aspiring designers to make connections between what they know and how they bring these ideas into their design process. These examples from Eugene, Eric and Elizabeth indicate design is about being a critical and reflective thinker. Elizabeth’s example also reflects aspects of the next element, which is concerned with asking deeper questions and making connections.

C (ii) Design is about asking deeper questions and making connections.

Related to the critical and reflective thinking of design is inquiry, specifically about deeper meanings of design. In particular, Tait indicates “what is really nice about doing research in design [is] you get an opportunity to explore and actually question what design is and how you actually design.” Taylor expands his design boundaries by stating:

As an industrial designer, we have a history of trying to make profit, money. Money for profit rather than social profit. But again, that’s something that, as a lecturer, a teacher, you get to look at whereas in practice, it’s much more difficult because your clients are about money. I think [in] industrial design there’s a lot of room to grow a gift society... The idea that people give away their time and that other people give them their time. So there’ll be no longer a need to charge for everything. I’m really interested in the difference between volunteers and paid workers.

In both these examples, Tait and Taylor reflect on the meaning of design; Tait questions the basic principles of design through his research, while Taylor inquires into the profit-making origins of design. Elaine elaborates:

What you allow yourself to do is actually begin to question your outer limits of design and this thing can begin to grow and it begins to be informed and informs other things... broaden and grow and take all the good things about design, which are about lateral thinking, making connections, this transdisciplinary framework that it operates in, almost subconsciously.
Elaine is describing how design is more than the outcome and more than the activity of designing. She asserts it is about the ability to think laterally, deeper, and globally, through questioning “outer limits,” “making connections” and working within a “transdisciplinary framework.” Similarly, Eric suggests that design is “making lives better for people” and Evan argues that “[d]esign is making things right – morally right and socially right.” Moreover, Ernie reports that if individuals “are going to earn money by being designers [they] should be making very healthy, useful decisions that are going to help society.” The first three participants (Taylor, Tait and Elaine) characterise this element by explaining their systemic thinking, the other three (Eric, Evan and Ernie) all focus on thinking about a deeper meaning of design, specifically in terms of adding value. Elaine’s example also reflects aspects of the next element, which considers how designers work collaboratively.

**C (iii) Design is about collaborative thinking that benefits communities of people.**

The category has so far described design as a way of thinking through critique and reflection, asking deeper questions and making systemic connections. A further way of thinking and reasoning is evident from the data, which concerns the connection of design with communities of people to facilitate their own development of current situations. This element differs from B (iii) *Design is about being able to communicate*, which focuses on designers’ ability to communicate and convey information when working in teams, inside or outside of the discipline. Contrastingly, collaborative thinking relates to encouraging the users, that is to say, the general public, to become active participants in designing their own projects. For example, Elliot argues designing services integrates communities of people because the “user becomes the co-producer,” and Evan explains how members of the public, within the right setting, “are participatory, they do join in and they are active.” Similarly, Trent shares his experience of a project driven by the community:

...about a little, sort of mini-ramp and skate area that developed on its own in a grassroots way, hidden away on some wasteland... So this ramp was in someone’s back garden and then they actually moved it over to some wasteland because they had to move house and rather than destroying it [they moved it] and then people found wood and fetched some more wood and sort of built obstacles and cleared the land with like, trimmers and stuff and then made this space that, in a sense, no one owned but everyone contributed to and then, eventually, someone complained about it and it was taken away from people.

Trent’s story has an unfortunate ending. However, the principle remains; collaborative design thinking is about local people participating in community-focused projects. These three examples emphasise community collaboration within design in order to benefit the wider neighbourhood.
Summary of Design is about a Way of Thinking and Reasoning

Three elements create the category that design is something greater than designed outcomes and the activity of designing, namely an underlying “designerly way of thinking” (Archer, 1979c, p. 17) and reasoning. Importance is placed on being a critical and reflective thinker, asking deeper questions regarding the meaning of design and of a lateral, systemic approach and adding value. Furthermore, collaborative strategies can bring communities of people together to design their own environments. As a result, this category focuses upon strategies of design thinking.

Design can be Serving, Shaping and Giving Meaning

As discussed in the literature review, theorists, practitioners and educators have continuously debated the meaning of design for many years, with the majority of conceptions originating from theoretical or practical expositions. Underlying this whole thesis are distinct meanings of design, which are discernable from the four sample groups of designers. In general, the categories gained from the participants’ interviews and their interrelated elements, as described above, complement much existing design literature. However, the meanings also differ in important methodological ways. These complementarities and differences are discussed below.

The focus of categories A: Design is about the designed outcome and B: Design is about the activity of designing are predictable, and identical meanings were proposed in Chapter two. That is to say, the former (category A) focuses on the designed outcome as either a product or a service; the difference between the two is described in the literature as “[i]n selling products, profit is maximised by selling more materials. In selling services, profit is maximised by serving more people with fewer materials” (Fletcher & Goggin, 2001, p. 21). Moreover, literature describing the specific development of products (Cresswell, 2006; Ulrich & Eppinger, 2000) and specific choices of materials and appropriate manufacturing processes for materials (Lesko, 1999) are accessible. Furthermore, problem solving processes (Jonas, 1993, 2001), creative practices (Melles, 2009), processes required to design specific innovative products (Cagan & Vogel, 2002), user-friendly products (Lidwell et al., 2003; Margolin, 1988; D. Norman, 1998, 2004; Sanders, 2006; Wickens et al., 1998) and communication through the use of design (Buchanan, 1992) are well debated. In short, the categorisation of A: Design is about the designed outcome and B: Design is about the activity of designing complement existing literature.

The descriptions found in category C: Design is about a way of thinking and reasoning are derived from the data, and are also evident within some of the literature. For example, in the first edition of the journal ‘Design Studies’, Bruce Archer writes:
...there exists a designerly way of thinking and communicating that is both different from scientific and scholarly ways of thinking and communicating, and as powerful as scientific and scholarly methods of enquiry when applied to its own kinds of problems (1979c, p. 17).

In Chapters two and three, I support Archer’s ‘designerly way of thinking’, and Cross’ Designerly ways of knowing (1982) arguing that design thinking typifies my own rational and logical assumptions (Chapter three). Moreover, I acknowledge that it informed the beginning of design as an academic discipline in the late 1970s (Chapter two). This particular view is explored by many other design researchers and theorists (for further examples, see Buchanan, 1992; Cross, Dorst, & Roozenburg, 1992; Dilnot, 1982, 1984a; Lawson, 1980). Thus, it was anticipated that Design is about a way of thinking and reasoning would be recognisable within the data, especially considering that a quarter of the data (the sample group of experts) are obtained from design academic researchers.

Despite the separate presentation of these categories and elements, there are distinct relationships between each. Design cannot be pigeonholed, nor can it be defined simply, and as such it is constantly growing (Buchanan, 1992). Table 4.13 provides a summary of the categories and their interrelated elements, with a special emphasis on the connections across and within the elements. A focus on the end result, means of design and connection to people link the elements across categories; serving, shaping and giving meaning connects the elements within the category.

Table 4.13. Commonalities in the Variation in Meanings of Design

<table>
<thead>
<tr>
<th></th>
<th>A: Design is the designed outcome...</th>
<th>B: Design is the activity of designing...</th>
<th>C: Design is a way of thinking and reasoning...</th>
</tr>
</thead>
<tbody>
<tr>
<td>The end result</td>
<td>...developing something tangible</td>
<td>...creative practice of designing</td>
<td>...being a critical and reflective thinker</td>
</tr>
<tr>
<td>Means of design</td>
<td>...the form or function of objects or services</td>
<td>...problem solving through designing</td>
<td>...asking deeper questions and making connections</td>
</tr>
<tr>
<td>Connection to people</td>
<td>...for the user</td>
<td>...being able to communicate</td>
<td>...collaborative thinking that benefits communities of people</td>
</tr>
<tr>
<td>Concept</td>
<td>Serving</td>
<td>Shaping</td>
<td>Giving meaning</td>
</tr>
</tbody>
</table>

On the whole, these categories are distinct, with common threads that link each. All three categories have elements that concern the end result, from the tangible to the abstract (critical and reflective thinking). Each category focuses on the meanings of design, for example, form and function, problem solving and searching for a deeper meaning. Furthermore, each category has a connection to people. The designed outcome is for the user; the activity of designing is being able to communicate with one another. Specific designerly thinking and reasoning enable communities to develop their own requirements.
and create their own solutions. Furthermore, as previously indicated, connections within the categories highlight the concepts of serving, shaping and giving meaning.

The concepts of serving, shaping and giving meaning (Heskett, 2002), presented in a different order in Chapter one, form the parameters in which design is described. The first, indicates design “serves our needs” (ibid., p. 10), which underpins category A where the development of aesthetically appealing, functional goods or services, designed for the needs of users, is explored. A second concept, “the human capacity to shape and make our environment” (ibid.), reinforces how design is about the creative problem solving activity of designing. The argument that design “gives meaning to our lives” (ibid.) is the foundation for the third category (C), which focuses upon a designerly way of thinking (Archer, 1979c). Here designers’:

...aptitude is taken big picture, being able to zoom in and zoom out... there is a nice saying that goes “if you break the rules you have to be honest” and I think designers are quite prepared to break the rules, respect the rules and still be honest when they are in this unknown territory (Ernie).

So designers’ evolve with having the ability to think about decisions using evidence and reflection; systematic thinking, seeing the bigger picture and making connections between flows and processes; and collaborative thinking, which is not only the capability to work with others, but also the capacity to enable communities of people to create their own desired projects for their specific environments (Bould, 2009a).

Little empirical research within existing literature focuses on what is actually understood by the word design; it is dominated by the theoretical or practical explanations, with the exception of Micklethwaite (2002, 2003). He interviewed business people, teachers, marketers, design practitioners and users of designed goods, asking them ‘What is design?’ In summary, he found design is related to the object, the activity, the designer and to “a specific context” (2003, p. 4). He concluded, Design means different things to different people and provides an “empirically-grounded mapping of the many meanings of design” (ibid., p.13).

In brief, the three categories created from the data are similar to those explored within Chapter two; both global and societal understandings of design alongside academic theoretical and practical understandings were distinguished. An important consideration is the difference between findings from my research and some global and social understandings of design that specifically focus on design being an object of beauty (see discussion relating to Figure 2.7, in Chapter two). Comparatively, the findings from my research indicate the focus is rarely about beauty. The significance and relevance of the variations of understandings found between the four sample groups of designers is explored in the next subsection, which also highlights important methodological differences between current literature and these findings.
Variations between Designers’ Meanings of Design

In the previous section, the three categories of design, found in the sample groups of designers, were explained in detail through a number of interrelated elements. These categories are: A: Design is about the designed outcome, B: Design is about the activity of designing and C: Design is about a way of thinking and reasoning. Conclusions can be drawn from these findings to indicate that Design can mean different things to different people (Micklethwaite, 2003), as discussed in the previous subsection. Importantly, however, there is a difference in how design is conceptualised by particular groups of designers. For example, the sample group of experts have a broader understanding of design than the teachers and the practitioners. Also the sample group of students have a similar but less reported understanding as the sample group of teachers.

In order to address the first research question, a comparison of the differences in meanings between the four sample groups of designers is required. A comparison necessitates identifying common meanings from each of the participants. Accordingly, a diagrammatical graph, which was created during the fifth stage of analysis from a series of matrices generated for each category and combined into the sample groups, provides information on each groups’ understanding of design. This diagram is shown in Figure 4.26 (further details on the methodology are explained in Chapter three: Stage 5: Comparison of cases in order to answer the research questions). Each bar on the chart represents one of the three categories discussed above: A: Outcome, B: Activity and C: Thinking and Reasoning. The purpose of the diagram is to visually illustrate differences in understanding of design by the four sample groups of designers and is not intended as statistical analysis.

![Diagram showing variations in understanding design from the sample groups of designers](image)

Figure 4.26. Diagram showing variations in understanding design from the sample groups of designers

Figure 4.26 shows the sample group of experts have a more global understanding of design. Here, emphasis is placed on the development of products and services, specifically to improve the lives of people. However, the experts are also constantly critical of their surroundings, reflect upon their journeys, ask deeper questions regarding the meaning of design, and make lateral and systemic connections. So, the focus of design for this sample group is less about the Activity and more about the Outcome or the Thinking and Reasoning.
The sample groups of teachers and practitioners made relatively little reference to design as a way of Thinking and Reasoning, the sample group of students made no reference. The majority of practitioners and teachers understood design as the Outcome and the Activity of designing. This view is aligned with design business, in which it is common to be part of a team of designers working on specific projects. The practitioners reflected these practices, associating cross-functional teams with the Activity of designing, although more emphasis is placed on the designed Outcome, specifically the form and function of the object. In contrast, the experts used collaboration as a strategy to improve design. Specific strategies included encouraging community members to become co-producers or sole producers of projects; a radical approach to traditional design Thinking and Reasoning.

On the whole, distinguishable differences in understandings between the four sample groups of designers are clear. The significance of these findings is discussed later in the chapter, where distinct meanings from each group are compared with the different meanings of sustainability (the categories of which are discussed in the next section). In doing so, it is possible to establish how specific understandings of design can enable or restrict ways of thinking about sustainability, thus enable interpretation of how restrictions might affect the implementation of sustainability within design practice and within design education. Appropriately, the next section focuses on the emergent categories and their interrelated elements that describe sustainability.

Understanding Meanings of Sustainability

The previous section focused on the variations in the meanings of design; findings exposed a diversity of conceptions. The sample groups of designers display recognisable differences in their understandings of design. Similarly, through empirical inquiry and an interpretivist, pragmatic grounded theory analysis, differences in meanings of sustainability are explored. Three categories stemming from the data, each comprising three elements show the variations in participants’ meanings of sustainability in Table 4.14, below.

Table 4.14.

Three Elements Create each Category of Sustainability

<table>
<thead>
<tr>
<th>X: Sustainability is conserving the environment through:</th>
<th>Y: Sustainability is progressing economic, social and environmental performance:</th>
<th>Z: Sustainability is building relationships between:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Production techniques)</td>
<td>(Consumer behaviour)</td>
<td></td>
</tr>
<tr>
<td>(i) …conserving resources</td>
<td>(i) …designing for renewability</td>
<td>(i) …people and planet</td>
</tr>
<tr>
<td>(ii) …simplifying manufacturing processes</td>
<td>(ii) …designing for longevity</td>
<td>(ii) …people and outcomes</td>
</tr>
<tr>
<td>(iii) …reducing the physical impact</td>
<td>(iii) …designing to make improvements</td>
<td>(iii) …designers and communities of people</td>
</tr>
</tbody>
</table>
In order to address the first research question, distinct meanings of sustainability are drawn from the sample groups of designers through the use of the constant comparative technique, which is explained in full in Chapter three. The first two categories (X and Y) relate to the production of designed outcomes. The third (Z) concerns consumer behaviour in terms of consumption. Later in the chapter, a comparison between meanings of design and concepts of sustainability is explored to identify connections and relationships.

X: Sustainability is Conserving the Environment through Production Techniques

Emerging from the data are different approaches to active conservation of the status quo, especially in terms of resource depletion and a reduction of humanity’s detrimental impact on the planet. For example, Ted asserts “there are only a limited number of resources, we can’t go to Mars and get more coal, we have only got what we have got” and Steffen suggests sustainability is “leaving things in a fit state for future generations.” Similarly, Simon argues that sustainability means “due regard to the environment so that we’re being responsible in not creating too big a footprint, [so, being] as minimal as possible.” A further understanding of sustainability is found within materials used in the manufacturing process; for example, Paddy maintains it is “not making composite materials. You know, so not adding two materials that can’t be easily disassembled for recycling in the future.” These examples indicate sustainability can be categorised as conserving the environment through production techniques, which is explained in three elements. These comprise: (i) conservation of resources, (ii) simplification of manufacturing processes, and (iii) being considerate of the impact on the environment. These three interrelated elements are described below.

X (i) Conserving resources used in the manufacture of designed outcomes.

In this case, sustainability is about conserving resources used in the manufacture of designed outcomes, which can be summarised by the adage “reduce, reuse, recycle” (Ernie) (Note: the adage is not advocated by Ernie himself). For example, products can be designed to “lower water usage” (Paddy) and careful material selection can lead to the avoidance of “unsustainable hardwood” (Trent). Samuel suggests “trying to use materials economically and use local distributors,” while Phelps confides “[w]e’re just doing some [tests] on trying to reduce the size of the next product, we’re doing [that] with the shipping, reduce the size of the packaging.” Tait contends “appropriate use of materials” is important for him and Thomas indicates “I’m interested in, sort of things like, the reuse of ready made objects, [the] recontextualisation of products and, you know, developing new meaning as a result.” However, the most popular focus of the adage (above) is recycling. Phelps asserts:

…doing the design is sourcing, I guess, sourcing of truly, I guess, environmentally sound, for what of a better word, materials which, you know, I mean is that recycled materials, is it bio materials of some description?… I mean having a product, being
able to be disassembled…surely you should be dismantling it for components that would go back for recycling in a matter of minutes, not in a long period of time.

In his example, Phelps indicates how sourcing recycled materials and disassembling products in order to recycle existing materials are central to his thinking about sustainability. Other participants demonstrate there are no set rules as to which material is better in terms of conserving the environment. For example, some choose “aluminium casting, where we use 100 percent recycled product” (Pauline) and other choose “steel over aluminium because of the energy content” (Percy). Todd advocates sustainability is about choosing the “right materials” which, as Pauline and Percy imply, can be challenging, as one material can be 100% recycled, the other uses less energy in manufacture. A further focus for sustainability is on “zero waste” (Pierre), as Pauline suggests sustainability is “zero usage in terms of your using something that is replaced or the cycle is such that you have zero waste.” In summary, these examples indicate how sustainability is about conserving resources used in the manufacture of designed outcomes.

X (ii) Simplifying manufacturing processes in order to conserve the environment.

A second notion of conserving the environment through production techniques concerns simplifying manufacturing processes with the aim of “[r]educing energy usage” (Phelps) or to be “energy efficient” (Toby). Earl summarises “[i]f the company can make money without creating as much pollution and waste, so that is the challenge.” Theodore reports:

I teach as well, manufacturing technologies, so the way that you manufacture the product. So even designing for assembly, designing a product for assembly, if we can design it with minimal parts, that would be part of the sustainable product design because they are using less operations to do that.

Theodore suggests that using fewer operations and reducing the number of parts in a product will lead to sustainability. Paddy and Trevor argue the importance of “design for disassembly” (Paddy; Trevor), which Percy explains as “not gluing [and] making things easier to take apart and put together” is an approach to simplify the disassembly process, aiding the ability to separate and recycle materials at the end-of-life of the product. Hence, simplifying the process of production conserves resources, therefore reducing the environmental impact of production, which is a concept explored in the following element.

X (iii) Reducing the physical impact of human beings on the planet.

The previous two elements describe conservation of resources and simplifying manufacturing processes. Here, the focus is on reducing ecological footprints and causing less harm to the planet, specifically with the strategy of preserving what is currently available, now and for the future. For example, Todd reasons:
...sustainability, in general is, what I read more and more and my understanding is that we actually consume products which implies that you use something up... If we keep going like this, you know, at the end we’ll smoke the planet up... there is a joke about sustainability, which I found quite funny where two planets meet each other in space. One is Earth and the other is another one, [which] says to the Earth, ‘Gee, you look shit today’ and the Earth says, ‘Yeah, I’ve got homo-sapiens’ and the other planet says, ‘Oh, don’t worry I had it before, you get rid of them and it will all get back to normal’. It’s like an illness for the planet and I think it’s true. I think when we are gone; it’s 50 years and the planet is back to normal. So it might be us being the problem itself.

The main concern for Todd is the planet and how human beings are the cause of large environmental problems. Todd’s joke indicates how the earth will rid herself of her problems and human beings will cease to exist, and when this happens the planet will flourish. Eddie suggests reducing carbon because “[w]e know that those carbon emissions are doing damage; they are increasing the CO$_2$ concentration.” Alternatively, Steffen argues sustainability is:

...about slowing things down and achieving a very relaxed state of being and that happens very often to people with those pure nature experiences. So I think that it’s important to be able to preserve that, almost preserve that for kind of, well, the future of the human race sounds a bit stupid, the future of the sanity of the human race, maybe. Without having that as a resort or something to go to, then yeah, it’s, I mean if you’re in a city all the time or if you’re in built up environments all the time and there’s never any way to escape that, people would just go mad.

Steffen suggests the necessity to “preserve” nature for “the future of the sanity of the human race,” while Todd and Eddie indicate the importance of conserving what is currently available for the future of the earth. Both perspectives advocate reducing the impact on the planet, one for the wellbeing of the environment, the other for the health of society.

Summary of Sustainability is Conserving the Environment through Production Techniques

In summary, this category focuses on conserving resources, simplifying manufacturing processes, and reducing overall negative impact on the environment. Each element has originated from the participants and prioritises reducing what currently exists, specifically within the production of designed outcomes, to facilitate conservation of the earth. The next category considers progressing current practices rather than conserving them.

Y: Sustainability is Progressing Economic, Social and Environmental Performance through Production Techniques

The previous category concerned reducing materials and simplifying production methods in order to conserve resources and the negative impact on the planet. However, Terence argues “sustainability is the idea that things shouldn’t get worse, at the very least,” explaining “[a]ccepting the current level of environmental damage and degradation and
sustaining it is probably not the right answer.” He concludes “I think we probably go beyond sustainability and actually look for improvement.” Similarly, Toby and Edmond indicate:

Sustainability is the step forward from being green, I think. Being green is being aware of environmental impacts and using environmentally friendly materials and being energy efficient and those sorts of things. That’s, to me, that’s being green and that’s part of being sustainable but being sustainable is taking that further, so making sure that any of the material you’re using are sustainable in that they’re renewable, that they’re not damaging to the environment but I think that true sustainability for me is when you start considering life-cycle and where the materials come from, what the objects you’re dealing with do for people and how long they stay in the market and what happens to them after their use and so, whereas to qualify as being green, there’s a fairly strict set of criteria in order to be that or not. Being sustainable is much more complicated because of that life-cycle (Toby).

…it is design process that can enable a lot of really social and environmentally positive outcomes. I was really inspired by that and maybe that is what sustainable design is about. It is about using the design process in a way that actually progresses the social environment performance beyond just the economic comparative that operates as we know it (Edmond).

In these examples, Toby and Edmond build on concepts suggested by Terence that sustainability is not accepting and maintaining the current state of resources, but actively looking to make improvements. Accordingly, these aspects create the elements that form this category, namely Sustainability is progressing economic, social and environmental performance through production techniques. These comprise (i) designing for renewability, (ii) designing for longevity, and (iii) designing to make continued improvements to the economy, environment and to society. Each of these elements is explored below.

**Y (i) Designing for renewability.**

In his example above, Toby suggests materials and energy used within the production of products needs to be renewable, which is further explored by others. Samuel explains “instead of creating heaps of carbon emissions, using power and stuff that will run out eventually,” renewable resources “like with solar power, using the sun” can be used. Tane states “investigating wind power” and “using electrolysis from water, creating power from water” are alternative approaches of designing for renewability. Pierre indicates designing for renewability in physical objects, such as furniture, is difficult. He asserts:

I mean look at a true sustainable furniture product. What would it be? It would be made of a renewable material like wood or bamboo or something. I mean that’s just a product which comes out of the earth and will go back to the earth or it’s a product which is made from plastics and metals which is truly, you know, basically has got a really good recyclability and is definitely going to end up again in the ‘technical nutrients’ [(see McDonough & Braungart, 2002)].

Pierre suggests that the only truly sustainable material is softwood obtained from fast-growing trees such as pine and bamboo. For other inorganic materials such as plastic and metal to be renewable they have to be recyclable, and then recycled. Therefore systems
have to be in place to collect these materials when they reach their end-of-life; for example, “closed looped systems and recovering materials” (Trevor). Similarly, Sabina indicates sustainability is about the life-cycle of a product, where “what happens at the end,” is as important as every other step “from the concept to the production.” Sabina describes how the life-cycle is about materials and resources, about distribution, consumption and “how the customer buys [the physical object] and then how the customer disposes of it.” Earl explains life-cycle analysis and impact assessment, by reporting:

So we use what we call...impact factors, which are single figure score life-cycle assessment values for typical material and processes. So the students use these to estimate the environmental performance over the life-cycle of a product, which includes all the materials, the energy, transportation, the processing of the materials, [and] input in use phase, which can be energy water, paper, other things.

Both Sabina and Earl indicate consideration of each step in the production of a physical object. Designing for renewability considers renewability of resources and the life-cycle of those materials once in production. The following element considers the length of time these products can last.

Y (ii) Designing for longevity.

In this case, sustainability means products can be designed durably, for longevity, meaning “creating things that are keepers...things that people hold on to and when they don’t want them anymore they don’t just throw them away” (Sheila). For example, Thomas indicates:

...the only way [for some companies] to grow was a continuous stream of new products to market. Now, that’s not sustainable and I think that in terms of sustainability, I think what we have to is, we have to design products that live for long periods of time, that exist for longer, that aren’t disposable, that you wouldn’t cast aside, that have got value out, you know, outside of the immediate novelty because in doing that, we actually wrap up the energy and the, you know, embody the energy in the materials and the product for a longer period of time and that mitigates the effect of manufacturing. If you continuously just reiterate bringing new products to market and making other products redundant, I don’t think that’s, I can’t see that being sustainable.

In his example, Thomas’ concern is how some businesses only understand growth in terms of planning when products become obsolete. He asserts that this continuous, disposable stream is not sustainable. Similarly, Patrick reasons “I would call sustainability something that’s thought of to last longer than you would normally think about,” and Sol describes sustainable design as “something that lasts or that’s timeless.” Toby designs sustainable furniture that “will stand up to being around a long time...it has removable covers so...you can have a chair that is constantly renewable in its look. So therefore, the whole chair last longer.” Simon argues that sustainability does not incapacitate design, but produces opportunities for designers; he opines “there’s a challenge to make things last longer.” Tait’s assertion that “longevity is incredibly important” categorises this element.
Y (iii) Designing to make improvements.

A third meaning associated with progressing economic, social and environmental performance through production techniques concerns making continual improvements. For example, Terence suggests “[r]eally good design should improve the environmental situation so that every time you make something, it should actually add value rather than...take away value.” Eric focuses on societal benefits by indicating “the goal is to improve lives.” Similarly, Pierre states:

…it’s about people working together for kind of, to include aspects which are not just to do with making money. Aspects of organising, aspects in the commercial context, of their work life, so that you’re thinking about the environment and thinking about other social issues that relate to what you’re doing and process of continued improvement, it’s about the next generation, making the... world better for the next generation but it’s also about improving things here and now, today and starting, you know, with really simple things.

In his example, Pierre reports making “continued improvements” for future societies, and indicates how in order to achieve these improvements people will have to work together and begin “today.” He also recognises economic sustainability, but reports it is “not just to do with making money,” and Edmond argues “you can’t have economic progress and growth without stable environmental and social underpinnings.” Terence, Eric and Pierre indicate they actively progress environmental and societal performance. Moreover, Edmond claims these two facets (environmental and societal) provide a foundation for improving economic performance. Thus, these examples inform this element of design to make continued improvements to the economy, environment and society.

Summary of Sustainability is Progressing Economic, Social and Environmental Performance through Production Techniques

In summary, the examples within these three elements describe sustainability as finding ways to progress economic, social and environmental performance of outcomes. Sustainability is about designing for renewability, longevity or generally designing to make continual advancements. As with the previous category, this category focuses on the production of designed outcomes. In contrast, the next category concerns the consumption of designed outcomes by modifying consumer behaviour through building relationships between different parties.

Z: Sustainability is Building Relationships between Affected Parties

The previous two categories focus on the meaning of sustainability, firstly through conserving the planet and secondly through progressing economic, social and environmental performance to add value. Both categories are concerned with the production techniques of designed outcomes. In contrast, this category concerns the designer’s role in influencing the
consumption of products, specifically by modifying the behaviour of consumers. For example, Terrence argues “the first objective is probably to reduce, if possible, the overall demand for stuff,” and Taz asserts:

...to me it is a lot about behaviour, modifying people’s behaviour. I am conscious of small behaviours like littering and corporate behaviour with user group behaviours, where you end up with something very short term and turn things over. Cell phones, fashion and that sort of stuff, like fashion is a human need but there has to be some balance in there somewhere and through to larger behaviours, corporate behaviour or community behaviours and society behaviours... it is how those products interact partly with the users, you have a product that people need and want. It is not just a product which people want and therefore becomes a short term thing when they want something else, it is actually meeting an immediate long term need and grow with them and they don’t want to chuck away and in which they develop a relationship with and it gets the best out of and it makes them feel good.

Hence, Taz’s concern is modifying the behaviour of different groups of people, from individual behaviour such as littering to corporate behaviour such as finding a balance between short-term objectives and long-term goals. He also indicates the importance of building relationships between consumers and their products, in order for them to become emotionally attached to their products so they do not want to throw them away. Furthermore, Elliot reasons “sustainability means living in another way that you cannot compare to now,” and Parker explains his conception of sustainability is “[s]omething that’s sustainable within a community or somehow sustains your community, some sort of partnership there.” These examples categorise how sustainability encompasses building relationships between affected parties; for instance between (i) people and the planet, (ii) people and outcomes, and between (iii) designers and communities of people.

**Z (i) Building relationships between people and the planet.**

For some of the participants, sustainability involves building positive relationships between human beings and the planet, with the intention to facilitate designers’ and consumers’ understanding of the natural environment, thus creating a more constructive partnership. For example, Elizabeth suggests:

I think of sustainable design, having read *Cradle to Cradle* [(McDonough & Braungart, 2002)](http://example.com) and things like this, that there is an element of minimising environmental impact and looking for a more harmonious way for human expression and human material culture and human built environment, to have a more symbiotic relationship with the environment instead of a detrimental relationship, that’s what is happening.

Elizabeth indicates that the meaning of sustainability is having a more “symbiotic relationship with the environment” rather than a “detrimental” one. Similarly, Emily proposes “[l]ets talk about [sustainable design] in terms of what it is, some sort of relationship with environmental systems and resources.” Evan also reports “[i]n industrial design and in graphic design it has to do with the relationship to the planet and human behaviour.” He continues “so we don’t use up the resources for the next generations and that means more careful planning, it means awareness of social issues of perception and of
values.” Alternatively, Emily indicates that building positive relationships with the environment is more than just conserving what is currently available for future generations. She asserts:

> When you talk about sustainable design, the whole defining sustainability changes so frequently and so quickly that you have to ask yourself these questions every year. Because not only does our understanding of our relationship with the planet we inhabit change but also our environment up here [indicates around herself] changes and ultimately it is about how we can feel.

For Emily, her connection to the environment is constantly changing, meaning she must modify actions and behaviour appropriately. These examples illustrate this element of building positive relationships between people and the planet.

**Z (ii) Building relationships between people and outcomes.**

A second approach to building relationships extends one of the elements from the previous category. The element, Y (ii): *Designing for longevity*, concerns the lifespan of a designed outcome and explores ways in which to increase useable life. Similarly, this element focuses on building relationships between consumers and their products. Considering “we are living in a society that is a throwaway society” (Eddie), the challenge is not just the durability of the object but “design[ing] things…that people will want to keep around them for a long time” (Toby), “creating products that...are desirable longer” (Patrick) and an object that “lasts a long time and it’s treasured by the person that owns it” (Samson). Tait questions:

> …how do you make an object last longer? How do you make an object, you know, it continues to grow with you and you continue to grow with it, you build up a relationship with it, it becomes personal to you, it ends up being something because of it, perhaps because of the fantastic initial design of it but it becomes something that you never want to axe or you want to keep for a lot longer.

Tait indicates “build[ing] up a relationship” with the product is a challenging task, but one that can ensure the longevity of the object. Thus, focusing on building relationships with people and outcomes can extend the life of the product by changing people’s behaviour from participating in a throwaway culture into developing emotional attachments with their chattels.

**Z (iii) Building relationships between designers and communities of people.**

The category so far has considered building relationships between people and planet and between people and outcomes. Here, developing connections between people and people, or designers and communities of people who are outside of the discipline of design is important. For example, Pierre reports “it’s about people working together to include aspects which are not just to do with making money.” Eric states it is about “participatory design” where members of the community direct the design projects. Ethan explains
sustainability is “rooted in a real context with real people with a real issue.” Elliot’s expertise is in service design and he explains building relationships means “all the actors [have to be recognised], it is a social system.” Elsie explains sustainability through the concept of “sustainable communities.” She asserts:

There are a group of people all over the world that for very different reasons are practically introducing sustainability into their lives. Sometimes we call them utopian by coincidence. [Others are utopian] by design [and] some of them also want to save the world, [then] you are utopian by design, you have a vision and ideology and this ideology means these people behave in a sustainable way.

Elsie explains how different communities are sustainable for different reasons, what she calls “utopian by coincidence or by design.” These examples illustrate different understandings of sustainability that incorporate building relationships between designers and communities of people.

**Summary of Sustainability is Building Relationships between Affected Parties**

In summary, three interrelated elements can be identified from the four sample groups of designers, describing different approaches to building relationships between affected parties. The first focuses on the relationship people have with their own habitat and the wider world. The second concerns how relationships can be built up between consumers and the products they purchase in an attempt to guide consumption patterns away from the current throwaway model. The last element focuses on encouraging designers to work with communities of people in order to enable them to make their own decisions. In this way, designers are grounded within context thus outcomes focused around the requirements of specific communities are created.

**Sustainability can be Useable, Useful and Desirable**

Chapter one outlined a number of unsustainable scenarios in terms of production and consumption patterns. Chapter two evaluated changing patterns of production through incremental change, moving from products to services, and changing patterns of consumption as a result of behavioural change. In a similar way that the previous categories (A – C) complement much existing literature, categories X, Y and Z do likewise. Again, there are some important methodological differences, which are identified and discussed below.

The first category, X: *Sustainability is conserving the environment through production techniques*, considers conservation of resources, simplifying processes and reducing impact on the planet. As suggested in Chapters one and two, design has a role in conserving the environment, and some industrial designers are more vocal about the imperative to act than others. Papanek staunchly encourages designers to abandon design for profit in favour of designing for the real needs of people (1971). He specifically focuses on developing countries, low socio-economic societies, people with disabilities and the aging population,
through using local and recycled materials. One of the (expert) participants, however, asserts that this way of thinking is counterproductive for designers, revealing:

We had a lot of ecodesign, environmental design, green design in the early ‘90’s and it got associated with a very strong aesthetic which is about recycled materials, it was about natural fibres and there was a strong association with the Ecodesign movement and the left in politics and a strong association with counter culture, and those outside the mainstream. It built up a wall or barriers, it was never going to become mainstream because not everyone is going to buy into that... That is why it is problematic, that is why I do not like Ecodesign, there is a stigma attached to it, there’s a history there and I don’t think it is very helpful (Edmond).

Edmond likens attempting to conserve resources currently available to past movements of “ecodesign, environmental design [and] green design” of the 1990s, indicating limitations due to the focus being placed on “recycled materials” and using “natural fibres.” He explains how these uses have created a “stigma” associated with anti-establishment and left wing political philosophies of environmentalism. In this way, the activism of the environmentalist can be argued as having thwarted the progression of sustainable design due to it being a “haven for the untalented, where ethics replace aesthetics and [designers] get away with it” (Hagan, 2003, p. 1). Here, the negative association of “geeks and hippies” led to ecodesign being viewed as somewhat dubious (ibid). This relates to Edmond’s reasoning that green design has an undesirable reputation, whereby it is not possible for products to be stylish or attractive; moreover there is the argument that some environmentalists want to turn off technology and live in the Stone Age (Tischner, 2006). This suggests that thinking about sustainability as being restrictive leads to the loss of both creativity and aesthetics (Hagan, 2003; Tischner, 2006).

Moreover, the environmental design movements have created the conception that, in order to be a good and green designer, individuals had to either stop designing or design “for the needy instead of the wanty” (Theodore). For example, Emily explains “[f]or me sustainable is ultimately, it has got to be planetary, but I find that completely overwhelming.” Parker also reports that, for him, “environmentally sustainable comes to mind” when asked what sustainability means. With this in mind, he later indicates how “it hasn’t particularly concerned me a lot, except for the fact that we don’t have a white paper disposal or paper recycling type operation here.” These examples illustrate the potentially restrictive nature of environmentally focused design thinking. Trevor admits:

...it’s something I’ve been wrestling with because first, when I went back to education, I thought, yeah, I can do the Victor Papanek [1971] and I can stop producing more products myself and I can actually train new designers and that’s more sustainable practice for me as a designer and then I had this, I woke up one night and I thought, ohh Jesus, what have I done? I’ve actually, I’ve replicated myself and if I don’t get it absolutely right, I’m actually producing young designers who might not embrace sustainability, so you’re creating an exponential problem.

Trevor suffers feelings of guilt as a designer and even more so as an educator, believing he has exponentially created new uncaring producers of stuff; young designers...
who are driven to make more products. Trevor’s realisation corresponds with Papanek’s argument, but conflicts with Edmond’s. In short, Trevor contemplates stopping designing due to his belief that he has a negative influence on the environment. It is a notion driven by his guilt for being a product designer, which reinforces Edmond’s case that ecodesign suffers from a negative stigma.

The second category incites less debate, but an equal amount of complexity. This category concerns the meaning of Y: *Sustainability is progressing economic, social and environmental performance through production techniques*. Here, progression rather than conservation is the focus, since working towards improving the planet, people and generating profit is deemed essential. Thomas explains a process of creating new products:

...while you have the product life-cycle going up in this S-shaped curve, underneath it, you have the profit cycle and the profit cycle is out of sync with the product life-cycle and it peaks earlier on. So even while there’s massive demand for a new product, you’ve already peaked in terms of your profit and you may be producing more than any other time but your profit is on the slide because other companies have introduced product to market and so the margins are being squeezed and all this sort of stuff and the outcome of it was that in order for companies to grow and expand, the only way of doing it was to introduce new products to market so that they could capture the sweet spot in the profit cycle and basically, the only way to grow was a continuous stream of new products to market. Now, that’s not sustainable.

Here, Thomas indicates the profit cycle of a product, suggesting this current model of production is not sustainable. This continual stream of products to market reflects the planned (built-in or functional) obsolescence discussed in the first chapter, where products are designed to malfunction early in their life-cycle and require premature replacement. Thomas continues:

I think that in terms of sustainability, I think what we have to, is we have to design products that live for long periods of time, that exist for longer, that aren’t disposable, that you wouldn’t cast aside, that have got value out, you know, outside of the immediate novelty because in doing that, we actually wrap up the energy and the, you know, embody the energy in the materials and the product for a longer period of time and that mitigates the effect of manufacturing. If you continuously just reiterate, bringing new product to market and making other products redundant, I don’t think that’s, I can’t see that being sustainable.

Thomas asserts how this process of production cannot be sustainable, suggesting designers need to create products that are durable and serviceable in order to embody the energy used in manufacture. In these examples, Thomas questions the longevity of a product; conversely, Tait questions how we “build up a relationship” with that product so “it becomes personal to [us].” Thomas focuses on built-in or functional, planned obsolescence; Tait on perceived or psychological, planned obsolescence. The difference between their understandings of design influences their understanding of sustainability; for example, Thomas refers to outcomes as objects (as opposed to objects and services), and Tait
pays attention to the service (relationship) gained from an object, the latter is further explored later in the chapter.

The first two categories have laid the foundation for the third category, Z: *Sustainability is building relationships between affected parties*. The aim of which is to challenge planned (perceived or psychological) obsolescence through designing in ways to encourage building positive relationships between affected parties (people and planet, people and outcomes and designers and communities of people). There is a need for designers to now re-orient themselves within the discipline towards new ways of thinking with regard to sustainability (Manzini, 2008). That is to say, a different way of considering sustainability is evident in this last category (Z), which also supports some key design researchers. For example, Barr (2003) and the UK-based Department for Environment, Food and Rural Affairs (DEFRA) (2008) have explored building relationships between people and planet. Chapman (2009) writes about building relationships between people and designed outcomes, and Manzini and Jégou (2003) and Meroni (2007) investigate building relationships between designers and communities of people. In this way, the deeper meanings of sustainability, namely people connecting and working with and for others outside their own disciplines, becomes grounded within each relationship.

On the whole, participants in the study disclosed a variety of meanings relating to sustainability, resulting in the creation of three categories; two indicate the production of, and one the consumption of, designed outcomes. These understandings are supported by some design-in-sustainability literature. Key epistemological differences between the literature and my findings are distinguishable when exploring commonalities between design thinking and sustainability thinking from the four groups of designers (discussed in the next subsection). Table 4.15 provides a summary of the categories and their interrelated elements, with special emphasis on: *view of resource, means of sustainability, and intention*.

Table 4.15.

*Commonalities in the Variation in Meanings of Sustainability*

<table>
<thead>
<tr>
<th>Focus on:</th>
<th>X: ...conserving the environment</th>
<th>Y: ...progressing performance</th>
<th>Z: ...building relationships between affected parties</th>
</tr>
</thead>
<tbody>
<tr>
<td>View of resource</td>
<td>Production of designed outcomes</td>
<td>Consumption of design outcomes</td>
<td></td>
</tr>
<tr>
<td>Means of sustainability</td>
<td>...conserving resources</td>
<td>...designing for renewability</td>
<td>...between people and planet</td>
</tr>
<tr>
<td>Intention</td>
<td>...simplifying processes</td>
<td>...designing for longevity</td>
<td>...between people and outcomes</td>
</tr>
<tr>
<td>Concept:</td>
<td>Useable</td>
<td>Useful</td>
<td>Desirable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Three commonalities are identified across the elements of these three categories. The first is the view of resources, where category X focuses on conservation, Y explores renewable sources and Z concerns the relationship people have with the natural environment where raw materials are dug out of the ground. From there, the natural resources go through energy intensive processes to create recognisable materials that are transformed into treasured or disposable items. These ideas link to the following commonality, which is the means of sustainability. For category Z, this is the building of relationships between the object and its owner, for Y it is making the object last longer (greater durability) and for X it is to simplify the processes used in order to require less energy and enable designed objects to be recycled at the end of their useable life. A further connection established here is the intention of sustainability within design, in other words whether to reduce impacts, make improvements or build relationships with people to develop their own, desired projects.

Within each category is the underlying conception of: useable, useful and desirable. Specifically, in terms of sustainability, ‘useable’ could be recycling efforts, reducing energy consumption, careful choice of materials, or simplifying manufacturing processes, all in order to reduce the physical impact of humans on the earth. ‘Useful’, on the other hand, is adding value to current situations through designing for renewability, longevity and durability and to make economic, environmental and social improvements. The concept of ‘desirable’ is thinking about sustainability in a different way to the two previous, practical aspects. In this conceptual manner, the aim is for designers to work towards building relationships between people and place, people and artefacts, and people and people. Thus, ‘desirable’ describes the state in which people have relationships with, and understandings of, the interconnectedness of everything.

In brief, the categories discussed in this chapter were obtained through a pragmatic grounded theory analysis, and constant comparative method of categorisation to uncover interrelated and hierarchical meanings. These meanings, although addressed within current literature, differ in procedural approach, specifically the comparison between the four sample groups of designers’ understandings of design in relation to these three categories of sustainability. The following section focuses on the commonalities between the six categories (three for design and three for sustainability) discussed within this chapter, which also highlight important methodological differences between current literature and these findings.

Variations between Designers’ Meanings of Sustainability

In the previous section (Understanding Meanings of Sustainability), the variety of meanings gained from the four sample groups of designers was described. These were organised into elements that created the following three key categories: X: Sustainability is
conserving the environment through production techniques, Y: Sustainability is progressing economic, social and environmental performance through production techniques, and Z: Sustainability is building relationships between affected parties. In the previous subsection (Sustainability can be useable, useful and desirable), conclusions were drawn from these findings to indicate that sustainability means different things to different people. In order to address the first and key research question, it is imperative that the differences in conceptions of sustainability, in relation to particular sample groups of designers, are compared. In this way, connections and patterns between how the sample group of experts understand sustainability in comparison with the sample group of teachers or practitioners can be recognised. In turn, questions are addressed such as: do the sample group of students have similar understandings to the sample group of teachers? To facilitate answering the first research question, a diagrammatical graph (see Figure 4.27) shows each group’s understandings, represented as the following categories: X: Conserving, Y: Progressing, and Z: Building Relationships.

Figure 4.27. Diagram showing variations in understanding sustainability from the sample groups of designers

Not unexpectedly, Figure 4.27 shows that the experts indicate Building relationships between affected parties to be a popular category, which was considerably more dominant than Conserving and Progressing. On the contrary, Conserving the environment, alongside Progressing economic, social and environmental performance were the predominant categories for the sample group of teachers. Similarly, Conserving the environment was more popular amongst the practitioners, while some of the students favoured Progressing, with other students referring to Conserving and even fewer referring to Building Relationships. Different discernable patterns can be identified for all four sample groups of designers. The experts gradually indicate Conserving to be less important than Progressing, which is less important than Building Relationships, which is almost the opposite of the practitioners, whom indicate Conserving as being more important than both Progressing and Building Relationships.

In brief, distinct differences in meanings of sustainability between the four sample groups of designers are recognisable. The significance of these differences is discussed in the next section.
Comparison of Meanings

In the chapter so far, I have demonstrated different meanings of design and sustainability and shown how interrelated categories of meanings are formed from each. The aim within this section is to explore the variations in these meanings and the implications of the resulting relationships and connections. The categories are hierarchical, but not mutually exclusive, and are summarised in Table 4.16. Here special emphasis is given to the proposed commonalities between design and sustainability, which are useable, useful and desirable, and also serving, shaping and giving meaning.

Table 4.16.

<table>
<thead>
<tr>
<th>Meaning of design:</th>
<th>A: ...designed outcome</th>
<th>B: ...activity of designing</th>
<th>C: ...thinking and reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meanings of sustainability:</td>
<td>X: ...conserving the environment</td>
<td>Y: ...progressing performance</td>
<td>Z: ...building relationships</td>
</tr>
<tr>
<td>Concept:</td>
<td>Useable - Serving</td>
<td>Useful - Shaping</td>
<td>Desirable - Giving meaning</td>
</tr>
</tbody>
</table>

As previously proposed, the words ‘useable’, ‘useful’ and ‘desirable’ are often associated with the activity of designing objects and services (Buchanan, 2001; Cagan & Vogel, 2002). However, these concepts are common within the categories for both design and sustainability. For example, ‘useable’ is the ability to be used, which underpins categories A: Design is about the designed outcome and X: Sustainability is conserving the environment. The elements for the first category (A) concern how design “serves our needs” (Heskett, 2002, p. 10), such as developing beautiful, functional, tangible goods and services that meet the requirements of users. In the second category (X), the meaning of sustainability concerns conserving resources and simplifying the processes involved in the manufacture of objects, with the intention to reduce the physical impact on the earth. Thus, respecting the natural environment by only taking what is necessary, in this way, serves the needs of the earth.

The second concept ‘useful’ is the ability to add value or be beneficial in a practicable way, which is fundamental to categories B: Design is about the activity of designing and Y: Sustainability is progressing economic, social and environmental performance. These two categories focus on “the human capacity to shape and make our environment” (Heskett, 2002, p. 10) through the creative, problem solving practice of designing, and designing for renewability, longevity and to make continued improvements to the economy, environment and to society.

The third concept of ‘desirable’ is a physical attraction, but also a necessary course of action that “gives meaning to our lives” (Heskett, 2002, p. 10) and underpins categories C: Design is a way of thinking and reasoning, and Z: Sustainability is building relationships. The
elements that create category C focus on the importance of critical and reflective thinking, asking deeper questions regarding the meaning of design and of lateral, systemic thinking to add value. Furthermore, collaborative strategies can bring communities of people together to design their own specific projects. These elements are reflected in category Z, which includes building relationships between people and their physical environments, between consumers and their products and giving capability to communities to enable them to develop their own specific projects. Accordingly, sustainability also focuses on strategic, critical and reflective thinking (Dewberry & Monteiro De Barros, 2009; Mann, 2011; Tilbury & Wortman, 2004; Wahl & Baxter, 2008).

In summary, the concepts of useable, useful and desirable, and serving, shaping and giving meaning are key links between design and sustainability. Are there commonalities between how the different sample groups of designers understand design and sustainability, specifically in relation to these links? Can the differences in meanings of design influence sustainability? The significance of these meanings for the four sample groups of designers is explored in the following subsection. A comparison of meanings exposes notable differences between the groups, the implications of which are explored in the subsequent chapter (Chapter five).

Variations between Designers’ Meanings of Design and Designers’ Meanings of Sustainability

In the section above, I have discussed significant connections and relationships between the categories of meaning for design and the categories of meaning for sustainability. The discussion that follows here considers the relevance of these connections and relationships to specific groups of designers. For example, analysis of the findings indicate that the sample groups of teachers and practitioners made relatively little reference to design as a way of thinking and reasoning, while students made no reference to it at all. Instead they focus on design as being about an activity or as an outcome; does this understanding of design influence their understanding of sustainability? In order to address this question, the distinct meanings of both design and sustainability determined from the sample groups of designers must be compared. Accordingly, this final subsection of the chapter compares the variations in meaning between the four sample groups of designers.

To facilitate comparison of understandings by designers, the findings shown in Figure 4.26 (see page 138) are compared and contrasted to those in Figure 4.27 (see page 153) in a diagrammatical graph in Figure 4.28 (overleaf).
Analyses of findings and the diagram above show the experts predominantly refer to Design is an outcome, and a way of thinking and reasoning, and Sustainability is building relationships between affected parties. Importance is placed on reflection and critique and lateral, systemic thinking that adds value and builds relationships between communities of people, between each other, and with owned objects, and also with physical environments. That is to say, the experts rarely made reference to aspects of Conserving the environment. In contrast, the teachers and the practitioners emphasised Conserving. In the majority of cases, both teachers and practitioners focused on preserving resources. Both these groups also made mention of Progressing economic, social and environmental performance through production techniques, the teachers significantly more so than the practitioners. Relatively less emphasis for the teachers and practitioners is placed on critical, reflective and systemic thinking, or engaging with people (Design is a way of thinking and reasoning). The students place more importance on progressing economic, environmental and societal performance than the other categories; in the meaning of design they focus on the designed outcome.

Moreover in the interview process, the experts rarely separated design from sustainability, often indicating how the two were so closely linked it was challenging to discuss them separately. Emphasis was often given to other skills such as critical thinking, communication, collaboration and creativity more than specifically focusing on teaching about sustainability. These ways of thinking about design and sustainability suggest that both share common elements (Bould, 2009a; Mann & Bould, 2011), which is a notion further explored in the following chapter.

In summary, these sample groups of designers exhibit different understanding across the six categories; the experts display the broadest and most in-depth understanding of both design and of sustainability, while the students show the least. What is clear from these findings and the subsequent discussions is the clear difference in meanings exhibited by the experts, compared to the remainder of the groups. The experts’ conceptions of design focus on serving our needs, but also giving meaning to our lives; the latter is interconnected with
the third category of sustainability, building relationships. So conclusions can be made that broader understandings of design can lead to broader understandings of sustainability, although narrower understandings of design do not necessarily lead to narrower understandings of sustainability (see, for example, the students). Nevertheless, narrower understandings of design do impede being able to think systemically and relationally, thus hampering the ability to move past conservation of the environment and progress performance towards building relationships between people and planet, outcomes and each other. How do these differences in meanings affect the inclusion of sustainability in the teaching and practice of design? This specific question is addressed in the following chapter (Chapter five).

**Summary and Conclusions**

This chapter focused upon the first research question, namely: what are the commonalities and differences in meanings of design and sustainability for different groups of designers (international experts and Aotearoa-based teachers, students and practitioners)? In this chapter, I have explored six rich categories of meaning of both design and sustainability, of differing size and complexity, and with elements of varying depth, all of which stem from the participants’ interviews. The results of this chapter show broad understandings of both design and sustainability, with commonalities within and between these meanings, specifically in the concepts of serving, shaping and giving meaning. In this way, it is possible to move from usable and useful solutions towards a desired state of sustainability, but the interconnectedness and complexity of sustainability requires the systemic, lateral, critical and reflective thinking associated with findings in category C: Design is about a way of thinking and reasoning.

A comparison of meanings from each sample group shows the experts display distinctly more global understandings of both design and sustainability. In general, the sample groups of teachers, students and practitioners exhibit narrower understandings of both. Can these variations in understandings influence how sustainability is incorporated in the teaching and practice of design? The following chapter builds on the foundation of understanding explored here in order to investigate how sustainability is being included in the discipline and profession of design, and to examine if different understandings of design and sustainability can affect its integration into design.
CHAPTER FIVE

RESULTS: VARIATIONS IN DESIGNERS’ APPROACHES TOWARDS SUSTAINABILITY IN THE TEACHING AND PRACTICE OF DESIGN

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Introduction

Chapter four extracted the distinct meanings of design and sustainability from the participants. The interrelated nature of both design and sustainability was explored and described as serving, shaping and giving meaning. It was suggested that differences in the understanding of the breadth of meaning could impact on how sustainability can be incorporated into the teaching and practice of design. The current chapter builds on these findings to address the second and third research questions, which concern the influence of design thinking on sustainability, and the subsequent implications for inclusion. As described in Chapter three, a pragmatic grounded theory and constant comparative method to analyse and categorise data led to the sample groups of designers being separately analysed. However, as the categories emerged, the findings from the sample group of experts and teachers merged together to form the first two categories (1 and 2). Similarly, data from the sample group of students and practitioners combined to form the latter two categories (3 and 4). These four categories are outlined in Table 5.17.

<table>
<thead>
<tr>
<th>Sustainability can be included in the teaching of design:</th>
<th>Sustainability can be included in the practice of design through:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: ...specifically</td>
<td>3: ...a reactive approach</td>
</tr>
<tr>
<td>2: ...indirectly</td>
<td>4: ...a progressive approach</td>
</tr>
</tbody>
</table>

The categories fall into two specific sections, one focusing on the teaching of design, the other on the practice of design. Each category has a number of interrelated elements; at the end of the description of each element, a mini case study contextualises that element. Five mini case studies are exemplar cases from the sample groups of experts and teachers, chosen as representatives of a particular element of the first two categories. Four exemplar cases from the sample groups of students and practitioners represent elements within the latter two categories. A discussion at the end of each section compares approaches to specific meanings of design and sustainability reported in the mini case studies.

At the end of the chapter, findings from categories 1-4 are further discussed and compared with findings from the previous chapter. The discussion focuses on the implications of how different understandings of both design and sustainability can affect how sustainability is incorporated into the teaching and practice of design. Results indicate a direct correlation between how sustainability is understood and how its inclusion is approached. Throughout the chapter, I build an argument that a global understanding of design can lead to a more global understanding of sustainability; this could lead to more progressive and proactive ideas and a deeper understanding of the interconnectedness of
sustainability to just about everything. Moreover, I suggest better inclusion of sustainability in teaching will mean integration throughout degrees or programme, either specifically or indirectly. Similarly, for the profession of design, when interrelated and complex problems are appreciated, sustainability is included and a broad range of thinking enables designers to consider the consequences of decisions and adopt systemic thinking; thus, in this way it can become part of the culture of a business. The following sections focus on four categories, and provide information for the discussions at the end of the chapter.

**How Sustainability can be Included in the Teaching of Design**

During the analysis process, two distinct categories derived from the sample group of experts and teachers but were not identified within the sample group of students and practitioners. These two categories are created from five interrelated and hierarchical elements that describe different ways sustainability can be included in the teaching of design.

**1: Sustainability is Specifically Included in a General/Specific Design Degree**

Analyses of the educators’ data (experts and teachers) indicate that sustainability can be specifically included in the discipline of design; a number of approaches facilitate its inclusion. For example, Trevor reports he includes “a generic, sustainable practice paper” that runs for fourteen weeks (the length of a module) and is aimed at first year students. Earl indicates his role is “teaching product designers about environmentally friendly, and certainly ecological design and sustainable design” in a year long course specifically addressing sustainability (the name of the course cannot be revealed in order to maintain anonymity). Emily reports she teaches a non-sustainability specific course in architectural design. However, she does include sustainability, which is methodologically different to both Trevor and Earl. These approaches thus form three interrelated and hierarchical elements, which are detailed in Table 5.18 below.

Table 5.18.

*Three Elements Create the Category Sustainability is Specifically Included*

<table>
<thead>
<tr>
<th>1:</th>
<th>Sustainability is specifically included:</th>
<th>The degree course is a:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>As a specific component in a degree course –</td>
<td>General design degree</td>
</tr>
<tr>
<td>(ii)</td>
<td>Specifically throughout degree course –</td>
<td>Specialised sustainable design degree</td>
</tr>
<tr>
<td>(iii)</td>
<td>Specifically throughout degree course –</td>
<td>General design degree</td>
</tr>
</tbody>
</table>

Three mini case studies accompany these elements and focus on three experts: Eugene, who teaches sustainability as a specific component of a general design degree, Edmond, who teaches a three-year, specific degree programme in sustainable design and Elaine, who specifically integrates sustainability throughout a general design degree. In
order to compare the differences in approaches to the inclusion of sustainability, the mini case studies also show Eugene, Edmond and Elaine’s understanding of design and sustainability (as discussed in Chapter four).

1 (i) **Sustainability is specifically included as a short component in a general design degree.**

One approach to the inclusion of sustainability in the discipline of design is through a sustainability specific component of a design course, which could be as short as a lecture or as long as a project that runs for the duration of a module. Similar to Trevor in the example above, Ted explains how he includes “one, maybe two, lectures out of 36 lectures” which are “explicitly on sustainable design.” Thomas reports “I think I ran the first [project in] industrial design here, that was specifically on sustainable design.” Theodore teaches sustainability as a module within a general design course or programme, and Terry includes a specific workshop on issues of sustainability, as a component. These examples indicate how sustainability can be included as a specific component within a general design course or programme and are contextualised in the following mini case study focusing on Eugene.

**Mini case study 1: Eugene.**

The first mini case study contextualises the first element, whereby sustainability is included as a specific short component in a general design degree. Table 5.19 shows the sustainability content of Eugene’s course, alongside the objectives of the course and his understandings of design and sustainability.

Table 5.19.

*Mini Case Study 1: Eugene Contextualises Category 1 (i): Sustainability is specifically included as a short component in a general design degree*

<table>
<thead>
<tr>
<th>Participant:</th>
<th>Eugene</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course title:</strong></td>
<td>“[S]enior level design course”</td>
</tr>
<tr>
<td><strong>Year:</strong></td>
<td>“[U]ndergraduate… senior level”</td>
</tr>
<tr>
<td><strong>Length of time:</strong></td>
<td>One semester</td>
</tr>
<tr>
<td><strong>Sustainability content:</strong></td>
<td>“I think I am at only the very beginning of teaching that with my teaching. I taught one lecture this semester on design for environment. I went through a list of some of the aspects that could be considered when designing a product in terms of, not only materials used and the manufacturing processes used but also the upstream impact of those materials… there was a big movement towards design for manufacturing which turned into design for assembly, which turned into design for ‘x’. Where ‘x’ is safety, reliability, design for all of these things and environment is just one of them. The reason I use that is that I also do teach design for manufacturing, assembly and things like this – so I just add it in to the list. So when you want to design for environment what are the things you have to think about, what are the tools that you have available, what are the types of analysis that you can use.”</td>
</tr>
</tbody>
</table>
| **Objectives:** | “The undergraduate course is very much focused on holistic design and we would like students to be able to apply their engineer knowledge to make decisions and
trade-offs and understand what those trade-offs are. We would also like them to understand what the role of those decisions are in society or in organisations like corporations, etc. We would like them to foresee the way that their products will interact with people in the public, the user; somebody else affected by the product, the person who has to maintain it or ship it or sells it or whatever. All these people are affected by their decisions. So somehow an awareness of these things, cataloguing of these things and bringing them to bear in the decision making process... our goal is to make decisions and move forward and create things and the more we understand the consequences of those decisions the better decision we can make so it is kind of like it is your goal to know everything in a way. The more that you know about more things, philosophy, psychology all these kinds of things you can bring them to bear in making decisions about a design.”

Eugene’s understanding of design - focuses on the outcome and the activity of designing; for example:
“Product design is the creation of an artefact. This is not an easy question to answer. It is the first question I ask when I teach a design course “what the heck is design?” and I don’t think I get two people to agree. You know design comes from the Latin root. That same word is ‘designate’. So design is about decision-making. You could say it is about creation but I think of it as being about deciding A instead of B and how do you make that decision. Well it depends on what information you bring to bear, what the goals are and what options you see and then how you make trade-offs. This is all what design is... how to assess what is needed without being told what to do.”

Eugene’s understanding of sustainability - focuses on conservation; for example:
“Probably the quote that I like is that sustainable design is figuring out how to meet the needs of current generations without sacrificing the ability of future generations to meet their needs. When I think sustainability I think of social, economic and environmental sustainability. In general sustainability just means the ability to keep doing what you are doing. That you are not running out of something, if you keep doing it this way, you will be unable to keep doing it that way in the future. I think more specifically about social, economic and environmental so environmental is you can’t use up all of your resources otherwise you can’t keep doing what you are doing. Social means you can’t create enough class disparity so that the poor are not going to rise up and destroy the entire system or something else will destruct the system, etc. For social and economic are related. Independent from economic there are issues of gender, class and race and all of these kinds of things.”

“Green design, environmentally friendly design... I am sure there is a difference between green design and sustainable design but I don’t think of them as being different things. Maybe sustainable could be broader because we could be thinking of things other than just environment. Whilst green implies a focus on the environment but I think of them as similar... [and environmentally friendly design] I don’t like. It is fine but I think it is a bit misleading. It is rare that our designs are actually friendly to the environment; they just might be less harmful than alternatives.”

In this mini case study, Eugene does not explicitly indicate that he includes sustainability, but he does report using the term “design for environment.” Eugene’s course objectives are to encourage students to understand connections between their decisions and the consequences of those decisions, especially in terms of the impact on the environment and society. In this way, he includes sustainability through specific design lectures.

Table 5.19 also gives an example of Eugene’s understanding of design and sustainability. Referencing the previous chapter, it can be seen that his understanding of design relates to category A: Design is about the designed outcome and B: Design is about the activity of designing as he focuses on “the creation of an artefact” and “decision-making.” His understanding of sustainability relates to category X: Sustainability is conserving the
environment through production techniques, as he focuses on “you can’t use up all of your resources” and “you can’t create enough class disparity so that the poor are not going to rise up and destroy the entire system.” These examples indicate how Eugene focuses on conserving the environment.

In summary, Eugene has a relatively narrow understanding of design and sustainability, focusing on the activity of designing objects and services. Similarly, he approaches sustainability as conservation of our current way of life and, in turn, includes specific, yet separate modules.

1 (ii) Sustainability is specifically included as a specialised design degree.

The previous element concerns sustainability being included as a specific and short component of a general design degree. In this case, sustainability contributes to an entire course or programme; for instance, Earl’s example (given at the beginning of the category) indicates a year long sustainable course. Furthermore, Emily, who teaches a variety of design courses, indicates she teaches one particular course specifically titled, “The history of sustainable architecture.” She indicates it “is pretty direct, addressing issues of sustainable design throughout the history of architecture” (Emily also teaches a general design programme, an example of which is used in the next element). Similarly, Eddie indicates he teaches “one full academic year for all four [design] courses [that are] on sustainable engineering” in a course that specifically addresses sustainability. Ernie reports teaching a course called “Product Life-Cycle Analysis,” adding that it will soon be renamed to include the words, “sustainable design.” He argues “it’s not a project design course, but it is a course where we get students [and] designers, to understand the influences and ramifications of sustainable issues.” These examples indicate sustainability is specifically included. This element is contextualised by Edmond in the following mini case study.

Mini case study 2: Edmond.

Edmond teaches a full three-year degree that is specifically dedicated to sustainability and design. Table 5.20 provides more details about Edmond’s programme.

Table 5.20.

Mini Case Study 2: Edmond Contextualises Category 1 (ii): Sustainability is specifically included as a specialised design degree

<table>
<thead>
<tr>
<th>Participant:</th>
<th>Edmond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course title:</td>
<td>“[Specific sustainability title]” (actual title is removed due to confidentiality)</td>
</tr>
<tr>
<td>Year:</td>
<td>“[T]hree year undergraduate programme”</td>
</tr>
<tr>
<td>Length of time:</td>
<td>Three years</td>
</tr>
<tr>
<td>Sustainability content:</td>
<td>“First year is a very basic introduction of skills equipping the students in the very basics of product design. We also give an introductory unit, as we call...”</td>
</tr>
</tbody>
</table>
it; for instance we give an introductory one on sustainability... we will introduce them to the back-story of climate change, or the back-story of the evolution of environmental issues and how it has seen a gradual migration from a niche interest to a more mainstream interest.”

“Year two is about introducing other contexts, like role of business in design management within design. We also teach specific tools and strategies, like eco-design tools and what specific strategies such as design for disassembly, design for durability, design to look at the whole bigger set of questions to do with sustainable production, consumption and how designers can start to intervene in the more systems based context. They do a work place at the end of year two and year three is as much about students doing more about self-managed projects. So they are proving back to us that they can apply what they have learnt over the last three years.”

**Objectives:** “First and foremost we are about product design, we are about training the next generation of product designers, [and] we believe that sustainability is one of the most important aspects that we have put it in the title. But it is embedded throughout the course and we see it as a very much as an integrated approach to product design much like you wouldn’t design a chair without considering ergonomics. We think you wouldn’t design a computer or a coffee cup without considering the environmental and the social performance of the product as well.”

**Edmond’s understanding of design** - focuses on the outcome, the activity of designing and a way of thinking and reasoning; for example:

“I like the way IDEO [award-winning global design firm] quote, they say, ‘Design is a verb and not a noun.’ I really like that because I see it very much as a process, a process of thinking. Again it doesn’t have to be an artefact, it doesn’t have to really necessarily have a tangible outcome; it is a process. I think if you had asked me that before I had become an industrial designer I would have thought that a design was stuff that looks nice... It is about using the design process in a way that actually progresses the social environment performance beyond just the economic comparative that operates, as we know it.”

**Edmond’s understanding of sustainability** - focuses on progressing performance and building relationships; for example:

“[It] is about taking the systems approach and really understanding the fundamental thing. You can’t have economic progress and growth without stable environmental and social underpinning, they are so contextually interrelated and we just don’t seem to really understand that very simple but constant truth that keeps coming up with us. When you start tampering and destroying environmental or social systems start falling apart, economic growth falls apart, [and] they are so interrelated.”

Edmond’s three year dedicated programme clearly teaches sustainability and design. He explains this goal is the desired intention of the programme. Findings from the previous chapter indicate that Edmond’s understanding of design is broad and incorporates thinking about the designed outcome, the activity of designing and design as a way of thinking and reasoning. For example, “[i]t is about using the design process in a way that actually progresses the social environment performance beyond just the economic comparative that operates, as we know it.” His understanding of sustainability focuses on progressing the environmental, economic and social performance of products, rather than conserving what we currently have, and he also indicates how building relationships between affected parties is important because all the systems “are so interrelated.”

In summary, Edmond has a broad understanding of design and of sustainability, and the two are very interconnected. With this understanding, he specifically, yet separately, teaches a three-year specialised course.
1 (iii) **Sustainability is specifically included throughout a general design degree.**

The previous element concerns the inclusion of sustainability in the form of a complete specialised design degree. The focus here is that sustainability can be specifically included throughout a design degree, despite the course not being a specialised sustainability degree. For instance, Emily, who, as already indicated, teaches different courses, specifically includes sustainability in her general programmes in design. She elaborates:

So the site design stuff, architecture and landscape is what it is called, pretty much most of our discussion there, is based on developing a relationship to natural systems, in the sense that that will build an environmental awareness, passing on best practices, all those thing are, I would say, is one of the easiest things to connect to sustainable design issues. The students get it pretty quickly, some of them run with it in terms of a passion and in terms of sustainable design. Some of them will grab onto it in terms of a formal exercise. So we have to allow for room within the two, but at the base line, even the students who are going to pursue it in terms of formal exercise have to still cross their t’s and dot their i’s, and make sure their storm water is managed, that their plant selection is sympathetic to environmental ideas.

Emily specifically integrates sustainability into her general architecture course, with the aim of inspiring students to “run with it” on their own. Emerson explicitly teaches a course with a title that contains the term “sustainable design.” Yet he argues:

I think that the message that sustainable design is good design and it is not a separate niche or discipline, I think it is an error to treat it as being something different. The key goal is to really embed sustainability within conventional design practice. That is the goal and not to treat it as a separate type of design.

In his example, Emerson asserts that treating sustainability as a separate entity to design, and including it in a specific “niche or discipline” is not going to embed it into “conventional design practice.” He reasons that design and sustainability are not separate entities and should be included as such, and Emily demonstrates how she actually integrates sustainability into design. In the following mini case study, Elaine elaborates how she specifically integrates sustainability into her general design course.

**Mini case study 3: Elaine.**

Elaine indicates that she specifically teaches sustainability within a general design degree. The mini case study in Table 5.21 describes how she does this.

Table 5.21.

*Mini Case Study 3: Elaine Contextualises Category 1 (iii): Sustainability is specifically included throughout a general design degree*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Elaine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course title:</strong></td>
<td>“Product design”</td>
</tr>
<tr>
<td><strong>Year:</strong></td>
<td>All years</td>
</tr>
</tbody>
</table>
**Length of time:** Three years

**Sustainability content:** “Linking design activity to a context of sustainability [through] systems, ecological thinking, environmentalism, eco-politics, people, historical overviews, efficiency and sufficiency debates, ecodesign strategies. Tends to be in lecture format and then tested out in practice, at [my current university] this means working on incorporating this info in design briefs and the students responses to these.”

**Objectives:** “To attempt to reflect values of sustainability which are people and system focused, and require a broad discipline knowledge base and the ability to conceive on new links, to make new pathways for humankind in a context of limits to growth.”

**Elaine’s understanding of design** - focuses on the outcome, the activity of designing and a way of thinking and reasoning; for example:
See Sustainability Content section above

**Elaine’s understanding of sustainability** - focuses on progressing performance and building relationships; for example:
“It’s about challenging an old view of what design does / what its potential is. Designing for sustainability is the opportunity to create diversity that allows humankind to travel different paths that are respectful of our environment, and that deliver outcomes which promote efficiency, equity and the potential of long-lasting flourishment of humans in, and as, nature.”
“...environmental sustainability becomes this other little thing that is added on, like ergonomics and the like, and they become quite small in the context of this big powerful design discipline... Sustainability is actually huge and design is just one discipline within it. Rather than trying to put sustainability into design if you put design into sustainability with all of the other subjects that are going on and all of the other things. And you begin to make links.”

Elaine specifically integrates sustainability into everything she teaches within the general design degree. The mini case study also indicates how she rarely separates design and sustainability. For example, Elaine asserts she focuses on “[l]inking design activity to a context of sustainability” and, in the process, “challenging an old view of what design does.” These comments indicate Elaine does not divorce sustainability from design, but works at ensuring they are interconnected.

Moreover, Elaine reports that treating the discipline of design as the overall context allows for incremental changes and improvements, but hampers more progressive, complex understandings and approaches. She argues that only considering sustainability from within the parameters of design is a restrictive undertaking because of the necessity to question the boundaries of design. Alternatively, treating sustainability as a parameter, where design works within a “transdisciplinary framework” is her recommended approach.

In summary, the understanding she demonstrates and the approach she takes reiterate sustainability is not a separate entity from design. Elaine continues to assert that approaching sustainability as separate from design makes it an add-on component that has little importance. She argues that for her, treating sustainability as being bigger than design and considering design to be just one aspect of sustainability (rather than vice-versa) means she encourages thinking about the links and connections required to address the complexity of sustainability.
Summary of Sustainability is Specifically Included in a General/Specific Design Degree

The three elements and the mini case studies, all identified within the data, show how sustainability can be specifically included in different ways. For the sample groups of educators, three predominant approaches arose. Eugene indicates how he includes sustainability as a specific short component in a design degree, Edmond reports how sustainability features throughout his sustainable design degree, and Elaine asserts that she specifically includes sustainability throughout a regular design degree. Thus, all three respondents incorporate sustainability in a specific way for their students, but their chosen approaches do so in very different ways. The following category concerns the inclusion of sustainability into the discipline of design following a non-specific approach.

2: Sustainability is Indirectly Included in a General Design Degree

The previous category described three elements; each explained how sustainability could be specifically included as a component of, or within, a general design degree and as an entire specific course or programme. A second, less specific, approach to including sustainability is also noted, and can be described as educators alluding to sustainability. The concept that good design is sustainable design is ascertained with in the findings, generating the hypothesis that the term sustainability does not need to be specifically included in a course if the teacher alludes to it throughout their teaching. For example, Tait asserts:

I think there are all sorts of ways of actually teaching sustainability and it can be quite indirectly, that is through the use of materials, looking at the use of the system as a whole, questioning why we actually need this [holds up an object] at all.

Here, Tait suggests that sustainability can be included indirectly through components of a design degree, such as materials or systems thinking. He reports “[g]ood design is sustainability;” however, he also insists “I will be honest and say I don’t make [sustainable design] my number one priority.” Thus, although Tait likens sustainability to good design and indicates how sustainability can be indirectly included, he claims it is not his prime concern. In comparison, Toby maintains “I don’t see a separation between design and sustainable design.” He connects this to how he teaches the subject by asserting:

...it comes across, I think, in just everything I do and so I don’t set out specifically to inform them about being sustainable but whenever there is an opportunity, I will tell them to be aware of it, but, yeah, I think just because it is part of my philosophy for design, it does come through in everything I do.

Toby passionately explains how he does not specifically set out to teach sustainability due to it being integrated into everything he does, thus forming the two interrelated elements depicted in Table 5.22 below.
Two Elements Create the Category Sustainability is Indirectly Included

Table 5.22.

<table>
<thead>
<tr>
<th>2:</th>
<th>Sustainability is indirectly included:</th>
<th>The degree course is a:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i)</td>
<td>As a component in a degree course –</td>
<td>General design degree</td>
</tr>
<tr>
<td>(ii)</td>
<td>Throughout a degree course –</td>
<td>General design degree</td>
</tr>
</tbody>
</table>

Two mini case studies contextualise these two elements: Tane includes sustainability in a general design degree as an indirect component and Eric, due to his depth of understanding of sustainability, indirectly includes it throughout a general design degree course. Tane is the only exemplar teacher to be used within the mini case studies due to none of the experts exhibiting this particular element.

2 (i) Sustainability is indirectly included as a component in a general design degree.

In this case, the majority of the sample group of teachers do not specifically include sustainability in the discipline of design; instead, they include it indirectly and infrequently. For instance, Terence asserts:

I get quite irritated by the title, why would you have sustainable design? In a way, I don’t think it’s a good idea to have sustainable design. All design should be sustainable. Why would it not be? It’s a weird concept to say there’s this special design that’s sustainable and other design that isn’t. I think it’s just an aspect of good design [and] you can’t do a good design without it being sustainable.

Terence does not teach a specific module or course in sustainability, nor does he specifically include it, explaining that separating sustainability from design is “a weird concept.” However, he also discloses “I’m not sure that I do anything other than move in a general direction towards this sustainability idea, but when I think about it, it’s probably not good enough.” Similarly, Todd does not specifically teach sustainability, although he explains “I try to make [sure] the students are aware they can make a difference between choosing the right materials.” These examples indicate that, for some teachers (no experts indicated this element), sustainability can be indirectly included in the teaching of design as a component. Tane’s mini case study contextualises this element of the category.

Mini case study 4: Tane.

This mini case study, shown in Table 5.23, explores Tane’s understanding of design and sustainability, and the relationship between the two. Also, the mini case study reveals how he indirectly includes sustainability in the discipline of design.
Results: Variation in Approaches

Chapter Five

Table 5.23.

Mini Case Study 4: Tane Contextualises Category 2 (i): Sustainability is indirectly included as a component in a general design degree

<table>
<thead>
<tr>
<th>Participant: Tane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course title: “Industrial Design”</td>
</tr>
<tr>
<td>Year: “Second year”</td>
</tr>
<tr>
<td>Length of time: One module</td>
</tr>
<tr>
<td>General design content: “...one of the things that I’m actually doing right now is, for example, we have these projects in Industrial Design in second year and the main goal of the project is that students create a lighting project, a lamp composed... with the least number of components that they need... to create a light.”</td>
</tr>
<tr>
<td>Sustainability content: “So that [the lamp project] is a big challenge but I do give them the option of working with mains power so that they can plug the lamp to the mains or they can use any other form of energy as long as they use the components in a very poetic way and I’m supportive of them to investigate any form of energy. So they have been using, they started investigating wind power, but some of them are using solar panels and a few of them are still using electrolysis from water, creating power from water. Some of them are using dynamo type thing. So I’m not, and I never told them, you know, it has to be a sustainable project. I just gave them the option of investigating those technologies as part of a very specific brief that has nothing to do with sustainability but at least in that way, they realised that they can explore different alternatives and they don’t have to use only the sort of standard ways of, for example, in this case, using power from the mains. So hopefully, that means that use, or at least they explore alternative solutions for all of their projects, you know, including materials and what have you. So, also the life-cycle of the product and that kind of thing”</td>
</tr>
<tr>
<td>Objectives: “So [the project] is just opening their view and making them aware that, you know, which in this case turns out to be a sustainable solution, is just a solution that actually works better than the normal alternative.”</td>
</tr>
<tr>
<td>Tane’s understanding of design - focuses on the outcome and the activity of designing; for example:</td>
</tr>
<tr>
<td>“Design is a process to suggest potential solutions and convert them into reality. In my case, you know, from a very personal, very particular personal point of view, I like designing for happiness. That’s what I like to do. There you go (laughs). So yeah, I think design is a process that you can use for helping people achieve their goals. That’s one thing, sorting needs and some people may think that is also creating desire but I think that it can be a tool for helping people.”</td>
</tr>
<tr>
<td>Tane’s understanding of sustainability - focuses on conservation and progressing performance; for example:</td>
</tr>
</tbody>
</table>
| “...solving today’s problems without disrupting the future or whatever it is. I think that’s okay but I think that’s a very, you know, the way it’s being carried out, talked about at the moment, especially how industry is responding to those demands of sustainability, is really only, at the moment having very small solutions to decrease the impact that we are making to the planet in many terms and it doesn’t mean that it’s sustainable. You know, the tiny
changes won’t make, we are still increasing our environmental footprint for example, even with all the agreements that we are signing, always increasing the environmental impact and I’m not sure if we want to sustain a society like we have at the moment. I’m more interested in adaptability or ways, which we can change and that we can be flexible enough to adapt to different situations. You know in the end that may make us sustainable, that we don’t affect our environment in a very harmful way, but society can be happily living on the planet but I think that we need to learn a lot. We are really far away from getting anywhere close to that and I’m actually really happy that the oil is peaking, it is probably one of the best things that can happen to drive society towards sustainability.”

Tane’s approach to including sustainability in his teaching is not through specific lectures. He argues “I don’t really give lectures about sustainability;” instead, he “encourage[s] students to investigate topics that they’re passionate about and if sustainability is one of them then I give them plenty of encouragement.” In this way, he includes sustainability as a component, as he gives students the “option of investigating” sustainability. His understanding of design is about the designed outcome and the activity, including the “process to suggest potential solutions and convert them into reality,” and he states “it can be a tool for helping people.” Tane also indicates his understanding of sustainability as being conservation of current resources and also progression of the products’ performance in terms of “solving today’s problems without disrupting the future.”

In summary, Tane has not made the connections that design can be a way of thinking and reasoning, nor does he indicate this way of thinking in relation to sustainability. Tane indirectly includes sustainability in some projects, but reports that he does not do so specifically.

2 (ii) Sustainability is indirectly included throughout a general design degree.

The above element and mini case study indicate sustainability can be, on occasion, indirectly included in design. An alternative is an indirect, but thorough approach. Evan asserts “we don’t have a specific course in sustainability, we don’t wave flags about it, but it is woven throughout the curriculum.” Elliot suggests how service design alludes to sustainability without actually labelling it as such:

...when you have services you are actually changing the behaviour of people. There are so many factors it is impossible to calculate what will happen from an environmental point of view. It is impossible. What you can do is have an environmental profile that says, ‘if you use this service you can reuse the energy consumption but you actually increase the exportation and so on and so forth.’ So you have some sort of elements that individually you can calculate but when you put them together you are not sure the behaviour of people will be exactly that.

In his example, Elliot describes his approach to design as being the design of services, which indirectly includes sustainability in his teaching about service design. Elsie reports “people dealing with service design are much more aware of [sustainability].” Elliot explains this is possibly due to the focus of service design being about “systems thinking.” He continues, “every time you design a service, the user, the so-called user becomes the co-producer.” In this way, Elliot and Elsie, indirectly and through design, teach sustainability
without explicitly labelling them. Eve does not teach service design; instead she teaches a module about “design and social change” and she does not specifically indicate the inclusion of sustainability. She teaches her students that designers can influence societal change through their behaviour, explaining:

I talk to [my students] about the three aspects of economy, ecology and the social responsibility. Once they learn that, they realise that sustainable design just means responsible design. It is not even necessarily about being green that is what they think it is at first [and] they think it is about using green materials and things like that. In the end what they finally learn is that if people can’t use it, if people can’t afford it or it hurts somebody in the process, it is not sustainable.

Eve asserts that, for her sustainability and design are very closely linked, and she purposefully and indirectly alludes to sustainability. Ethan also indicates that he works on “more and more radical projects, which are rooted in a real context with real people with a real issue.” These examples illustrate how the word sustainability is not directly addressed; instead, the educator consistently, intentionally, yet indirectly alludes to sustainability.

In Chapter four I identified shared elements between meaning of design and sustainability. In this way, Tait also includes sustainability indirectly throughout a general design degree. He does so, however, with a different driver, not because he is passionate about sustainability but because he is passionate about design (specific drivers are explored in detail in the following chapter). For instance, when asked about sustainability Tait asserts “I think [sustainability] is important but I wouldn’t say I am an incredible advocate of it.” Subsequently, when asked about design Tait launched into an enthusiastic explanation of different ways of design thinking. He includes “minimal use of materials is incredibly important in design,” and “what is really nice about doing research in design [is] you get an opportunity to explore and actually question what design is and how you actually design.” Moreover, he asserts “longevity is incredibly important” but indicates he does not mean the life-cycle of a product instead the relationship that can be created by questioning “[h]ow do you make an object, you know, it continues to grow with you and you continue to grow with it, you build up a relationship with it.” This example suggests that despite Tait’s insistence that he is not an advocate of sustainability, and that it is not his number one priority, he is integrating it into his teaching and practice through his broad understanding of the deeper issues and complexities of design.

In short, these examples indicate how sustainability can be inherently included into the teaching and practice of design, despite the word sustainability not being directly used. Eric’s mini case study elaborates this way of including sustainability.

**Mini case study 5: Eric.**

When Eric describes how he teaches design to his students, he rarely mentions sustainability. However, considering the range of meanings of both design and
sustainability identified in Chapter four, and the relationships between the two, it is clear that he consistently, but indirectly, includes sustainability throughout the discipline of design. Therefore, the mini case study, shown in Table 5.24, focuses on his approach and contextualises how sustainability is indirectly included throughout a general design degree.

Table 5.24.

**Mini Case Study 5: Eric Contextualises Category 2 (ii): Sustainability is indirectly included throughout a general design degree**

<table>
<thead>
<tr>
<th>Participant: Eric</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course title:</strong> “[Non specific name] class” (actual title is removed due to confidentiality)</td>
</tr>
<tr>
<td><strong>Year:</strong> “[F]ourth year”</td>
</tr>
<tr>
<td><strong>Length of time:</strong> One year</td>
</tr>
<tr>
<td><strong>General design content:</strong> “[Non-sustainability specific name] is a programme that started here about two/three years ago and what we do is bring together fourth year students from product design, graphic design, business and engineering; they work in teams.”</td>
</tr>
<tr>
<td><strong>Sustainability content:</strong> “We think innovation occurs in the centre [of], essentially, what is valuable to corporations, what is desirable for consumers, what is possible through engineering and what is good for society and the environment. So this is the model that we follow and we try to balance out these four things... This is society and the environment, this is people, this is corporation and this is technology and engineering. And very often there is friction between these. People want convenience, Americans at least and they find convenience in disposable objects. While that creates a big problem here [indicates the point between two key questions] so how do you resolve those kinds of things? Corporations want to maximise profit, well if you want to make something that is good for society I want to create products that are affordable, therefore there is a tension here and how do you resolve those tensions. So those are the kinds of things that I am interested in looking at. So we have followed this basic model. Students do research in all these four areas and we tell them that this is the sweet spot [indicates the middle point] this is where you want to locate your design.”</td>
</tr>
<tr>
<td><strong>Objectives:</strong> “For too long designers have been thinking only of creating the object while the goal is to step back and say, no we want to improve the lives of people. And therefore the object is only a by-product. It is actually a by-product. The goal is to improve lives because design has been taught for too long as an object based thing, we want to change that and say, well, in order to think of the entire life improvement process for people, you want to think about these four things, rather than just how will I make this desirable and beautiful. That is why the focus is on the cross functional teams of the focus on this model of innovation. Therefore, the emphasis is on health related products or products that, if we are approached by a corporation that says, we would like your teams to design a new MP3 player for teenagers. We would walk away from it because we don’t think it does anything in terms of social improvement... We as educators, we should start thinking about not just educating these student who are going through [the course] but also people who are buying this stuff that we put out there.”</td>
</tr>
<tr>
<td><strong>Eric’s understanding of design</strong> - focuses on the outcome, the activity of designing and as a way of thinking and reasoning; for example: “It is not about creating objects it is about improving people’s everyday lives. We are surrounded by so much stuff. Our lust for stuff will never go away. The key thing for us to do is to somehow to continue to feed that lust by minimising the harmful effect it can have. Improving everyday lives. It is not about the objects it is about the people... Essentially to be able to ask questions of everything you look at, almost like you are choos[ing] Descartes’ system of methodical doubt. You doubt everything that you see around you. Not just to ask what, how, why except those questions are important but also, ‘so what’ is just so critical.”</td>
</tr>
</tbody>
</table>
am going to design this in a certain way – so what? How will it impact, what happens when this object goes out into the world? So critical thinking to me means building a system within yourself where you are automatically sceptical of everything that you see.”

**Eric’s understanding of sustainability** - focuses on progressing performance and building relationships; for example:

“...not compromising anything about this world and in the process making the world a better place for future generations. That is one large way of thinking about sustainability. What gets difficult is that no one discipline or no one professional can do it on his or her own. We need to engage everyone across the board which includes engineering, public programmes, design, business, humanities, social sciences. All of these people need to work together in order to make a more sustainable world. One of the things that I think we should teach people is the understanding of sustainable development or sustainable living means is a sense of care. A sense of care for the people around you, a sense of care for future generations, a sense of care for your planet that you live on, that we are quickly affecting very badly. So I like to use the phrase a sense of care.”

In this mini case study, Eric does not specifically indicate that he teaches sustainability; instead, he focuses on encouraging design students to be critical and reflective thinkers, to ask deeper questions and make connections and to be able to work together, forming collaborative strategies that benefit communities of people. This approach relates to category C: Design as a way of thinking and reasoning. Eric indicates the importance of “[n]ot just to ask what, how, why, except those questions are important, but also [to ask] so what?” In this way, Eric inherently considers sustainability within his design thinking, describing sustainability by saying “I like to use the phrase a sense of care,” also arguing “[w]e need to engage everyone across the board.” Furthermore, Eric states, the “ultimate goal of design is making lives better for people.”

Eric describes the “[name of integrated model] Model” that specifically asks challenging questions such as “What is valuable to corporations? What is desirable for consumers? What is possible through engineering? And, what is good for society and the environment?” Eric’s course objectives that “improve the lives of people” align with category Y: *Sustainability is progressing economic, social and environmental performance of products through production techniques.* Eric’s course also brings together teams of students and lecturers from four different disciplines of “product design, graphic design, business and engineering,” where they “explore participatory design, feminist design [and] green design.” In this way typifying the category concerning building relationships between people, planet, and outcomes.

In summary, Eric’s understandings of sustainability and design are very closely linked; when he talks about design, he implicitly talks about sustainability. Thus, Eric cannot separate sustainability as a specific subject because, for him, sustainability is encompassed within design.
Summary of Sustainability is Indirectly Included in a General Design Degree

This second category focused on two particular approaches to how sustainability can be included in a design degree, both further described and contextualised by the mini case studies of Tane and Eric. Tane indicates how he does not specifically include sustainability, yet demonstrates including components of sustainability in projects. Eric also is not direct in his approach to sustainability, but contrastingly incorporates it through design. These significant differences in understandings are further explored at the end of the chapter. However, in the following section the variations between educators’ approaches are compared prior to discussing the meaning of the findings.

Variations between Educators’ Approaches to the Inclusion of Sustainability

The two categories, their elements and the descriptive mini case studies provide a variety of ways to include sustainability in the teaching of design. In order to address the second and third research questions, a comparison of the differences between the approaches of the sample group of experts and teachers is required. A significant difference between how the sample group of international experts compared to the sample group of national teachers is expected, but can similarities between the two be identified? This section compares the different approaches from these two sample groups of educators in order to address this question.

This comparison necessitates discerning common approaches to inclusion and is shown in a diagrammatical graph in Figure 5.29 (developed identically to Figures 4.26 and 4.27). Each bar on the chart represents one of the five elements from the two categories discussed above, which also correspond to the five mini case studies, 1-5 (shown in the legend, in square parenthesis). These are 1 (i) Specific + component, 1 (ii) Specialised degree, 1 (iii) Specific + throughout, 2 (i) Indirect + component, and 2 (ii) Indirect + throughout.

![Figure 5.29. Diagram showing variations in inclusion of sustainability from the two sample groups of educators](image-url)
The graph shows that the majority of the sample group of experts advocate either a *Specialised sustainable design* degree, or an *Indirect* approach that runs throughout a general design degree. For the sample group of teaching, a *Specific sustainable design* course is missing. Commonly found is that sustainability is being included as a *Component*. Importantly, however, this particular finding means that the majority of the sample group of teachers indicate some sort of inclusion of sustainability through a *Specific or Indirect Component* in a design degree. Hence, a commonality between the experts and the teachers is how sustainability can be integrated into design education through *Indirectly* being labelled but still incorporated throughout a general design degree.

On the whole, this diagram displays a broad difference in approaches between the experts and the teachers, but it also indicates that sustainability is being incorporated (in different ways) in the teaching of design in New Zealand. Findings also indicate differences between including and integrating sustainability into education, which is explored further in the following section.

**Sustainability can be Included in the Teaching of Design in a Wide Variety of Ways**

So far in the chapter, I have described in detail five distinct ways of how sustainability can be incorporated into the teaching of design. Each approach was contextualised with a mini case study. These findings build on research regarding the development of sustainable education in universities outlined in chapters one and two, and specifically the work of Sterling and Thomas (S. Sterling & Thomas, 2006; I. Thomas, 2009).

As indicated in Chapter one (specifically in Figure 1.2), Sterling and Thomas assert a sustainability transition of four stages equates to four stages of educational change: very weak = no change (or token); weak = education *about* sustainability; strong = education *for* sustainability; and very strong = sustainable education (2006) [emphasis in original]. Similar hierarchical understandings of sustainability integration can be seen within the analysis of my findings.

Table 5.25 compares the findings from my research study to Sterling and Thomas’ stages of development of sustainability in higher education. Emphasis is given to whether sustainability is treated as *integral or separate* to design.
Table 5.25.

Comparison of Mini Case Studies (1-5) to Sterling and Thomas’ (2006, p.355) Stages of Sustainable Education Development (see also Chapter one, Figure 1.2)

<table>
<thead>
<tr>
<th>Sustainability is included as:</th>
<th>Response</th>
<th>Societal change</th>
<th>Educational change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Specific Component General Separates ‘Bolt-on’ Cosmetic reform Education about sustainability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Specific Throughout Specialised Separates ‘Build-in’ Serious greening Education for sustainability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Specific Throughout General Integral Rebuild or redesign Wholly integrative Sustainable education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Indirect Component General Separates ‘Bolt-on’ Cosmetic reform Education about sustainability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Indirect Throughout General Integral Rebuild or redesign Wholly integrative Sustainable education</td>
<td></td>
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</tr>
</tbody>
</table>

The findings from my research study indicate that, although three distinct approaches to the specific inclusion of sustainability (mini case studies 1, 2 and 3) are distinguished, two of them (mini case studies 1 and 2) imply that sustainability is separate to design. The findings also indicate two distinct approaches that can be described as indirectly including sustainability in the teaching of design (mini case studies 4 and 5). Similarly, where sustainability is indirectly included in a general design degree as a component (mini case study 4) and not included throughout, sustainability is also treated as separate to design.

Comparing these findings to Sterling and Thomas (ibid.) shows that an approach where sustainability is included separately and as a component to the education (in this case design) can lead to sustainability being a ‘bolt-on’ response where the societal change is a ‘cosmetic reform’ and education is ‘about’ sustainability. If an approach to sustainability is separate but throughout the education, such as specifically in a specialised sustainability degree then education becomes ‘for’ sustainability, and it is built-in to the course. In this approach, Sterling and Thomas indicate the societal change is ‘serious greening.’ For societal change to be ‘wholly integrative’ then a rebuild or redesign is the necessary response and as such, creates sustainable education. This latter description can be identified in mini case studies 3 and 5, where sustainability is integral throughout a general design degree. However, my findings show two distinct approaches to this final “very strong sustainability transition” stage (ibid.), which is sustainability can be either specifically or indirectly labelled. Thus indicating that sustainability can be indirectly integrated into an existing design degree, meaning, in contrast to Sterling and Thomas, a rebuild or redesign of the programme is not necessary.

When these results are compared with similar studies, namely Ramirez’s (2007) international study and Watkins and Lofthouse’s (2010) British-based study, some
similarities and differences are found. For example, Ramirez (2007) indicates a move towards including sustainability as a specific, specialised degree course, which can be seen in a large proportion of my international sample. It is an approach that could be argued as being education for sustainability (S. Sterling & Thomas, 2006; I. Thomas, 2009) and found in only a small proportion of my national sample. Ramirez asserts that this specialised degree “sends a strong message to industry that more industrial designers are graduating with an increased awareness of their responsibilities to the environment and to society” (2007, p. 5). In contrast, my findings suggest that a separate specialised degree course is not the most popular in New Zealand, and although a separate specialised degree course is a strong transition to sustainability, it is not a wholly integrative approach (S. Sterling & Thomas, 2006; I. Thomas, 2009). Therefore, I propose that sustainability can be incorporated integrally and throughout general design degrees, both specifically and implicitly, which is a proposition further explored at the end of this chapter.

The findings of Watkins and Lofthouse’s UK based study indicate that the majority (twenty-four) of their participants included sustainability “discreetly throughout all design projects” (2010, p. 4). Thirteen of their participants included sustainability through a “single design project based module specifically focussing on sustainable design” or through “individual lectures,” seven of their participants included sustainability through a “lecture series” and two participants through “generic courses outside of the design department” (ibid.). Similarities to findings in the current study are identified. For example, my findings indicate the majority of the sample groups of experts are including sustainability indirectly or specifically throughout a design degree, which is similar to the above, “discreetly throughout all design projects.” Participants in Ramirez’, Watkins’ and Lofhouse’s, and my own study indicate that sustainability is included in specific design projects or specific design lectures, and all three research studies indicate more willingness from participants to include sustainability than previously assumed. However, our studies differ in epistemologies and methodologies; moreover, there are no previous studies to indicate the extent of sustainability in the teaching and practice of design in New Zealand.

Overall in this section, I have drawn connections between differences in how designers can incorporate sustainability in the teaching of design. In the meantime, the following section considers the inclusion of sustainability in the professional practice of design.

**How Sustainability can be Included in the Practice of Design**

Evident in the data are further differences regarding how sustainability can be included in the teaching and practice of design. Directly related to the two previous categories, and corresponding to the findings from Chapter four, are two more categories, both of which comprise hierarchical and interrelated elements that also reflect aspects
presented in the section above. They focus more on the sample groups of students and practitioners than on the sample groups of experts and teachers.

3: Sustainability is Included through a Reactive Approach

Emerging from the data is the concept that sometimes sustainability can be included in the practice of design in a reactive way. For example, Paige asserts:

I think it’ll be a pretty big shift [to think systemically] but I see, like with the [specific] products, they want to achieve, [specific environmental ratings] and to sell products into Europe, you need to have achieved some of those but it’s sort of reactionary. We do it because we need to get into a market rather than because we want to be a market leader in that field.

Paige reports how her design company includes sustainability due to a reaction driven by market demand rather than being a “market leader in [the] field.” Similarly, Pedro argues “[i]t would be good to have government legislation to get tough on people as well. You know, nothing bites people more than their pockets.” Therefore, this category is created from two interrelated elements, namely (i) recycling, saving energy or not being wasteful, and (ii) thinking about decisions and consequences.

Two exemplar and representative mini case studies accompany these elements. Both are from the sample group of students, but from different institutions; they comprise Sol, who has experienced sustainability through a specific short component in a general design degree, and Samson, who has experienced sustainability in two explicit lectures and through an indirect component of a general design degree. In order to compare the differences in approaches to the inclusion of sustainability, the mini case studies also show Sol and Samson’s understanding of design and sustainability (as discussed in Chapter four).

3 (i) Focusing on recycling, saving energy or not being wasteful.

Common foci in terms of including sustainability are “recycling” (Samantha; Simon; Sol), “saving energy” (Samuel) and “not being wasteful” (Seth; Shane; Simon). For example, Sabina indicates:

I’m flatting at the moment and one, because it saves money for us to be energy efficient and things like that because we’re students with not a lot of money and, two, it’s good for the environment and we’re all pretty conscious of that in the flat so we, you know, turn lights off and don’t use the dryer and only use the dishwasher once a week and things like that and we recycle.

In her example, Sabina indicates that she includes recycling and saving energy in her thinking about sustainability. Shane claims that, through the industrial design course in which he participates, he is “pressured into buying all these products [so] that I try to use as much of recycled material and stuff as possible.”
Sometimes a main concern of sustainability can revolve around packaging and this can be a single-issue focused problem. Polly, for example, reports “I think it’s very trendy, at the moment, to have more considered packaging for products and stuff like that” and Phelps describes “trying to reduce the size of the next product we’re doing with the shipping, reduce the size of the packaging.” Similarly, Paddy asserts “we currently do a few nice things like reuse the cardboard boxes two or three times” and Paige indicates “we try and do things around the office like recycle and turn lights off and compost.” Another focus is on the recyclability and usage of recycled materials in the manufacture of products. In the first design business (with no specific connection to sustainability), Parker argues for “[w]ise use of materials, so it can be recycled or you’ve got, you’re using recycled content.” Similarly, Polly asserts:

I don’t really have a choice in [what materials we currently use] but when you start looking at the concept for a new material, we’ll start looking at new materials and stuff, then we have an opportunity to actually look at recyclable materials and stuff and at least they have got it this time.

Polly suggests that, although she currently cannot make any changes to her selection of materials, there will be the opportunity to choose “recyclable materials” in the future. Paige focuses on waste management, indicating “[y]ou see how much waste comes out of a product. Like, for example, with the [product], when they’re [pressed] out, there’s a big bit left and it’s waste.” Patrick’s focus is on energy and he reports their product is “a lot more efficient in terms of its energy use than other [competitors’ products].” Polly agrees, stating the company is “always interested in energy consumption.” Hence, sustainability can be incorporated into design practice through engaging with recycling, waste reduction and energy efficiency. Moreover, in the second design business (which possesses environmental choice certification), Percy indicates how they have designed and manufactured a product “that is 100% recyclable and reusable.” Pauline, Pete, Pedro, Phelps, Pam and Pierre also proudly report facts about the same product.

Pedro focuses on the importance of “getting the right performance out of those materials” and claims that controlling where materials come from and their specific production methods is “not always that easy.” Phelps indicates thinking about trying to source “other materials available which have a better environmental story” and Percy reports having less confidence in the company’s engagement with sustainability by indicating how easy it is to recycle the thermo-plastic ABS [Acrylonitrile Butadiene Styrene]. He confides “but we don’t recycle it, so you can’t do anything with the scrap from the [product] that you have left over, which is hard to swallow.” He explains how this is also the case with other materials, especially in relation to supplies purchased from overseas:

…when you see what we throw out, of what we have got from China and it is not good and we throw out, even though maybe 50% of it is useable. You know, or the materials we cut and we have the off-cuts, I am pretty good at taking them home when I get my hands on them.
Percy indicates that, in his opinion, the company could engage more with sustainability by improving the “waste management” system. Similarly, Pete agrees by stating how he thinks a “lack of cash stops [our company] doing a lot of environmental stuff in production and waste management.” Pam adds:

...the amount of waste they have, like, for example, they have got [one particular product] which they cut in a nice shape and you cut that nice shape but what do you do with the rest? It just goes in the bin, so that kind of thing, you know, I would love to stop that. But it’s a design strategy again. Like you could say, hey, instead of cutting it like that, cut it a different way.

Pam, Pete and Percy all report how their company is not engaging with sustainability in terms of waste management, but all three indicate they think this is a sustainable option. Therefore, this category concerns the implementation of sustainability through a focus on recycling, and saving materials and energy. Sol’s mini case study contextualises this element.

**Mini case study 6: Sol.**

The sixth mini case study concerns Sol; he contextualises this first element of the category through his focus on recycling. Table 5.26 also shows what Sol means by the words design and sustainability.

Table 5.26.

Mini Case Study 6: Sol Contextualises Category 3 (i): Sustainability is included through a reactive approach with a focus on recycling

<table>
<thead>
<tr>
<th><strong>Participant:</strong></th>
<th>Sol</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of degree:</strong></td>
<td>“Bachelor of Product Design”</td>
</tr>
<tr>
<td><strong>Length of degree:</strong></td>
<td>“It’s a three-year degree, I think”</td>
</tr>
<tr>
<td><strong>Type of inclusion of sustainability by teachers:</strong></td>
<td>Specific short component</td>
</tr>
<tr>
<td><strong>Sol’s inclusion of sustainability in his work</strong> – through a reactive approach; for example:</td>
<td>“I can’t name off the top of my head but like, no, because I know I’m doing something that isn’t sustainable and I probably could but it takes more effort to do it that way and therefore I’m less likely to do it.”</td>
</tr>
<tr>
<td></td>
<td>“It’s recyclable, yes, but that takes more effort.”</td>
</tr>
<tr>
<td><strong>Sol’s understanding of design</strong> - focuses on the outcome; for example:</td>
<td>“It’s taking an existing product or something similar and then making it better or making it appeal better to markets, I suppose. So that’s re-designing it, designing something for a particular purpose.”</td>
</tr>
<tr>
<td></td>
<td>“Make it so that it’s more ergonomic, less harmful maybe to the environment, just using better materials and just like relooking at different ways that it can be done instead of how it’s already been done.”</td>
</tr>
<tr>
<td><strong>Sol’s understanding of sustainability</strong> - focuses on conservation and progression; for example:</td>
<td>“...something like, that can be kept, that can be constantly used or, you know, doesn’t just, I don’t know, can be reused. Something that lasts or that’s timeless so that it doesn’t, I don’t know, it’s quite broad. It’s just sustainable or it’s not like a product or design or anything...”</td>
</tr>
</tbody>
</table>


Table 5.26 shows an example of Sol’s understanding of design and sustainability. Referring back to Chapter four, his understanding of design relates to category A: Design is about the designed outcome, as he focuses on making existing products better. When asked what he means by ‘better’ he indicates “more ergonomic [and] less harmful.” This reflects his understanding of sustainability; for instance, “less material and less [of] everything really.” However, he also reports design is “[s]omething that lasts or that’s timeless;” in this way, he indicates his understanding of sustainability as also progressing the performance of an object through category Y (ii) Designing for longevity.

In summary, Sol has a narrow understanding of design, which is seen in his reductionist understanding of sustainability, although he also discusses designing for longevity. However, Sol mainly describes sustainability as being an effort, and is reactive when he includes it in his work.

3 (ii) Thinking about decisions and consequences.

In this element, the focus is on decisions and their specific consequences. For example, Steffen asserts he includes sustainability in his practice by “thinking quite carefully about the impact of the actions that you take and the decisions that you take, particularly with regard to the design of artefacts.” He complains about fellow students because of their lack of understanding of the consequences of decisions. He reports:

I mean the place where we stay, people quite happily throw all the organics into the bin and toss it out and it goes away somewhere else. You know, I speak to everyone else in my class. ‘Do you use shampoos or conditioners or dishwashing liquid that is completely, sort of environmentally [friendly]?’ well, of course not because it doesn’t impact them. It just disappears and so I guess, to me that’s where the legislation component comes in so that in order to sometimes push that sort of behavioural change, there actually needs to be legislation in place which creates that direct feedback or, you know, closes that loop and says, right, well there is actually a direct impact because we’re monitoring your drain and we can see that you put Drano and you know, X, Y and Z [toxins] back into the system and so that’s five penalty points or whatever it might be.
Steffen understands the relationship between decisions and consequences in a reactive way, where one thing leads to the next; he also shows his frustration that some of his peers cannot make similar connections. In contrast, Samson describes how he includes sustainability in his practice because he “only buy[s] really good quality things.” He elaborates by stating:

About eighty percent of the energy taken up in clothing that we use is in washing it rather than making it. So I just spent $220 on a lambs wool hoodie that I’ve had for about a month now and I haven’t needed to wash it yet because it’s such good quality that you don’t need to wash it… I spent a lot of time choosing it and worked hard to pay for it, that I don’t, that I look after it really well and I’m not going to throw it out in six months and it’s not going to get chucked in the tip or something.

Samson has spent time researching this specific product in order to understand the consequences of his decision. These examples illustrate that specifically thinking about decisions and their consequences is reactive, and this is further contextualised in the following mini case study of Samson.

**Mini case study 7: Samson.**

Table 5.27 displays a mini case study of Samson and shows how he includes sustainability in his practice and what he understands by design and by sustainability. Samson’s mini case study contextualises the element that sustainability can be included through a reactive approach, in particular, thinking about decisions and consequences.

<table>
<thead>
<tr>
<th>Participant:</th>
<th>Samson</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of degree:</strong></td>
<td>Focus on Product Design</td>
</tr>
<tr>
<td><strong>Length of degree:</strong></td>
<td>3 years</td>
</tr>
<tr>
<td><strong>Type of inclusion of sustainability by teachers:</strong></td>
<td>Two explicit lectures and as an indirect component of general design degree</td>
</tr>
<tr>
<td><strong>Samson’s inclusion of sustainability in his work</strong> – through a reactive approach; for example:</td>
<td>“Basically, I just did my thesis, research thesis, The History of Sustainability in Product Design and it was quite kind of a broad overlook but I started thinking about little, every day things basically after that and, at home, we have a hall light, like we have a hallway with the lights up a stairwell and it’s basically walk through and we’re constantly, we leave it on. I turn it off but everybody else leaves it on because they can’t be bothered turning it on and off every time. So I wanted to make a light that hangs underneath the skylight during the day and then lights the room enough to walk through because it’s basically an unused space except as just a bypass and so just to eliminate any, [there is a] need to be conscious about turning the light on and off.”</td>
</tr>
</tbody>
</table>
| **Samson’s understanding of design** - focuses on the outcome; for example: | “I don’t know. Well, it’s obviously finding better ways to do things. I kind of disagree with a lot, about what I’m seeing and I start to wonder why I’m studying design because a lot of things make our lives more complicated and they become more complicated and they break
and you can’t do anything else with them. They’re so specific and well refined and stuff, so umm, I don’t know. I’m not quite sure what my ideals are but basically it’s finding better ways to do things and making things a bit more generic so you can use them for something else when they’ve broken or, I don’t know, I’m really quite interested in that direction. But design, in general, I don’t know, it’s hard to say. That’s a big question.”

Samson’s understanding of sustainability - focuses on conserving; for example:

“It’s basically, it’s like setting up a system and every single small aspect of it, right down to the mind frame of everybody that lives in the system, I guess in a way that can keep going on endlessly as long as the natural environment wants it, you know and kind of, yeah, basically being fair to everybody within that environment, all the animals, plants and also cost is a big thing. Like ideally it comes cheaper than other ways that we’re doing it before. The more sustainable it should be, the cheaper it would be but in order to get there, I suppose it will take development and time.”

“If it’s made to a good quality and it lasts a long time and it’s treasured by the person that owns it, that’s a huge thing and that opportunity’s everywhere, like no matter how it’s made and no matter what it’s made out of it and no matter who makes it, it can always be made to a good quality, so there is no excuse not to be better and being able to replace certain components. Like the shoes, you know, NIKE shoes that you can replace the sole on, a sole that goes first. You know, things like that. And design for disassembly. These are just all things I’ve read about and I guess the government has a big effect on it as. Like, if a company is responsible for their product after it’s been used, maybe that becomes a cost, like you know, a cost from the shelf for what you pay to get it but then they will, that’ll expose inefficient ways and it all becomes a system that can keep going rather than like, ohh shit, well the landfills are all filled up so what do we do? Something can continue on, I guess. And, yeah, there’s so many different ways, aspects and product design such that can help that.”

In this mini case study, Samson (unlike Sol) studies with one teacher who has given two specific lectures on sustainability, and has encouraged the writing of a research report. Also, he has experienced an indirect component of sustainability through a non-specific project. Samson (like Sol) explicitly indicates the inclusion of sustainability in his work through a concern regarding the over-usage of energy and he demonstrates that he considers decisions and their consequences.

Samson previously indicated his understanding of design and sustainability; the former falls within the category of A: Design is about the designed outcome, as he focuses on “...finding better ways to do things and making things a bit more generic so you can use them for something else when they’ve broken.” This way of thinking reflects aspects of X: Sustainability is conserving the environment through production techniques. Samson also reports ways of thinking about sustainability that can be categorised as Y (ii) Designing for longevity and Z (ii) Sustainability is building relationships between people and outcomes. For instance, when indicating what sustainability means for him, he asserts “it lasts a long time and it’s treasured by the person that owns it,” thus suggesting a broader understanding of sustainability, in terms of designing for long life and building a relationship between an object and its user. However, Samson does not seem to make the connection that this way of thinking about sustainability can be applied to his own project.
In summary, Samson has a narrow understanding of design and a more global understanding of sustainability. However, he approaches the inclusion of sustainability by reacting to consequences of decisions.

**Summary of Sustainability is Included through a Reactive Approach**

Sustainability can be included in the practice of design as a reaction to demands, whether from customers or from legislation. This type of approach is characterised as dealing with one problem at a time and the interconnectedness of each decision is missed. Alternatively, sustainability can be included through a progressive approach, as described in the next category.

**4: Sustainability is Included through a Progressive Approach**

This category focuses on forward-thinking ways to approach the many different problems associated with unsustainability. For example, Preston reports that his company, which possesses an environmental certification, is “progressive, which is the main thing. It’s much better than it was, sort of when I started, eight years ago.” He continues, “it’s one of the approaches we take here, is to design products which have a long life-cycle. So people are less likely to throw them out and buy something else.” Pedro (from the same company) indicates how incorporating appropriate systemic thinking is essential for the design of products, “if they’re too hard to disassemble, they’ll just be thrown in the scrap or make the recycling of [the product] more difficult.” He goes on to report that sustainability is “always at the back of your mind,” explaining how “[u]ntil I came here, I didn’t consider it because it wasn’t part of the culture of where I previously worked.” Thus, two hierarchical elements create this category, including (i) the incorporation of systemic and life-cycle thinking, and (ii) sustainability becoming part of the culture of the people.

Two mini case studies focus on Patrick and Pierre and are representative of each element. The former is from a company that has no specific connection to sustainability, and the latter’s company incorporates sustainability in their philosophy. In order to compare their differences in approach to including sustainability, the mini case studies show the two practitioners’ understanding of design and sustainability (as discussed in Chapter four).

**4 (i) The incorporation of systemic and life-cycle thinking.**

Another way that sustainability can be included in the practice of design is through focusing on the “whole process of product life-cycles” (Santiago), where products are “dealt with effectively at the end-of-life” (Steffen), and “closed cycles” (Sabina) where there is “no waste product” (Sabina; Saul) because it feeds back “into the system” (Sabina). For example, Percy asserts that one of their products is easy to disassemble, stating:
the product is developed in a way which is extremely easy to refurbish, to reuse in a different way and to disassemble at the end-of-life and it is really easy to take apart, nothing is co-moulded, simple screws and in that way it is an extremely successful product.

In his example, Percy indicates that the efficiency of disassembly is important, either after or during usage, which is reiterated by Phelps and Pierre. Pam asserts “I’ve done life-cycle analysis on [five different products from this company].” These examples show how sustainability can be included in the practice of design through the incorporation of systemic and life-cycle thinking. This element is contextualised by Patrick.

**Mini case study 8: Patrick.**

In this example, the mini case study focuses on the incorporation of complex problems into the design of outcomes as a way of including sustainability in the practice of design. Table 5.28 shows how Patrick includes sustainability in his practice through systemic and life-cycle thinking, and what he understands by design and by sustainability.

Table 5.28.

*Mini Case Study 8: Patrick Contextualises Category 4 (i): Sustainability is included through a progressive approach, such as incorporating systemic and life-cycle thinking*

<table>
<thead>
<tr>
<th>Participant: Patrick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business: No specific connection to sustainability</td>
</tr>
<tr>
<td>Length of time at business: “I’ve been here for four years as a model maker and then I was an industrial designer here for about four years”</td>
</tr>
<tr>
<td>Role in business: Industrial designer and model maker</td>
</tr>
<tr>
<td>Patrick’s inclusion of sustainability in his work – through a progressive approach; for example:</td>
</tr>
<tr>
<td>“...say you set a design brief for something and you, the design brief doesn’t stay as one thing. The design brief actually evolves. People kind of want to say that’s the brief and that’s the criteria you measure yourself, you measure your design and performance next to the but the reality is that, not only design changes but the brief changes with that and to me, that’s something that’s kind of sustaining. It’s not like, yeah, that’s some idea of, that’s from a product point of view.”</td>
</tr>
<tr>
<td>“...we also look at designing products here from a systems point of view as well [describes some new products], so maybe you’re adding to the system of sustainability rather than actual product sustainability.”</td>
</tr>
<tr>
<td>Patrick’s understanding of design - focuses on thinking and reasoning; for example:</td>
</tr>
<tr>
<td>“Design, to me, a way of thinking, a process of thinking and it’s a, yeah, I think, I would, that’s what I call design. Some people think it’s actually doing, you know, when they talk to you and they say, ohh, what do you do, and you say, ohh, I’m involved in industrial design, and they’ll go, ohh, what’s that and you say, ohh, well it’s kind of like architects that design products and they go, ohh, okay, ohh right. So you’re a designer and it’s like, yeah, and they instantly pigeonhole you into the designing type of thing, but I think that design spreads further than that because design thinking can be used across any discipline, whether it’s business, marketing or, hell, I’m even using it in, basically developing our high performance plan for the national body for mountain biking. So, do you know, what I mean, it’s kind of a way of researching and thinking. So that’s what I think design is.”</td>
</tr>
</tbody>
</table>
Patrick’s understanding of sustainability - focuses on progressing and building relationships; for example:
“I would call sustainability something that’s thought of to last longer than you would normally think about and being able to be reused, redesigned, can be reused, something, in a way, sustainability can be something that’s evolutionary as well and just keeps evolving. To me that’s sustainable design or process. You can just keep changing, evolving.”
“Something that kind of, you know, an idea of what loops and it keeps going and it’s still cool 50 years later and it’s still there 50 years later and it still functions the way it was meant to do.”
“...designers that turn up and work here are kind of people that aren’t the consumerist designer. They do actually kind of think, ohh yeah, I do want to help with the, you know, creating products that, you know, last a lot longer or, you know, are desirable longer or perform longer, things like that.”

In this mini case study, Patrick works for the first business that does not explicitly indicate connections to sustainability. However, Patrick suggests that he includes sustainability in his work through systemic thinking. He also indicates the complexity of design briefs in relation to sustainability by remarking that they constantly change and have a no stopping rule.

Table 5.28 shows an example of Patrick’s understanding of design and sustainability. The former relates to category C: Design is about a way of thinking and reasoning, as he focuses on “a way of thinking, a process of thinking.” His understanding of sustainability relates to category Y: Sustainability is progressing economic, social and environmental performance through production techniques, due to his understanding that sustainability “just keeps evolving.” Also Z: Sustainability is building relationships between affected parties, because Patrick makes the connection between people and their outcomes, indicating his understanding of sustainability is making objects “desirable longer.”

In summary, Patrick has a global understanding of design and his meaning of sustainability incorporates the progression of performance, but also building relationships between people and outcomes. These examples indicate that Patrick includes sustainability though addressing complex problems and incorporating systemic thinking.

4 (ii) Sustainability becoming part of the culture of the people.

A further approach to including sustainability in the practice of design is through sustainability becoming “embed[ded] in people’s thinking” (Pierre). Pierre suggests his role is to insert sustainability in the “bigger picture” of the company. Pete states “if I think of something that I think will help, I’ll always make my point whenever I can;” he continues to emphasise this point by stating “I can design something that’s not going to be any worse [environmentally] than it can possibly be.” Preston indicates “[a]t the end of the day, it’s not about being sustainable. It’s about just good design.” These examples indicate that sustainability is becoming embedded as “part of the culture” (Pedro) of the company, which is contextualised by Pierre in the following mini case study.
Mini case study 9: Pierre.

The last mini case study in this chapter contextualises how sustainability can be included in the practice of design through the interconnectedness of everything; thus, it becomes part of the culture of designers. Table 5.29 shows how Pierre includes sustainability in his practice and what he understands by design and by sustainability.

Table 5.29.

Mini Case Study 9: Pierre Contextualises Category 4 (ii): Sustainability is included through a progressive approach, such as becoming part of the culture of people

<table>
<thead>
<tr>
<th>Participant: Pierre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business: Incorporates sustainability in their philosophy and hold an ‘Environmental Choice’ certification; they employ a specific sustainability champion and sponsor a researcher from a nearby institution to focus on sustainable issues.</td>
</tr>
<tr>
<td>Length of time at business: “two years, nine months”</td>
</tr>
<tr>
<td>Role in business: “Supporting the company with sustainability issues”</td>
</tr>
<tr>
<td>Pierre’s inclusion of sustainability in his work – through a progressive approach; for example:</td>
</tr>
<tr>
<td>“It’s not product design. It’s an extension of that to design with sustainability means for the company and trying to drive all those things and embed it in people’s thinking so that they solve little problems. So I’m co-ordinating that bigger picture.”</td>
</tr>
<tr>
<td>Pierre’s understanding of design - focuses on the activity of designing, and thinking and reasoning; for example:</td>
</tr>
<tr>
<td>“The organisation of, it’s applying creative thinking and, creative thinking and organising in logical fashions, businesses, not just businesses but it can be, yeah, businesses or organisations or problems can be social problems, can be business problems. It’s about applying creative and lateral thinking and in combination with, left and right brain, combination of left and right brain thinking to solve issues normally around solving an issues driven by solving an issue.”</td>
</tr>
<tr>
<td>Pierre’s understanding of sustainability - focuses on progressing and building relationships; for example:</td>
</tr>
<tr>
<td>“…it’s about people working together for kind of, to include aspects which are not just to do with making money. Aspects of organising, aspects in the commercial context, of their work life, so that you’re thinking about the environment and thinking about other social issues that relate to what you’re doing and process of continued improvement. So, yes, it’s about the next generation, making the next generation, world better for the next generation but it’s also about improving things here and now, today and starting with really simple things.”</td>
</tr>
</tbody>
</table>

Table 5.29 indicates Pierre works for a different design business than Patrick. This company specifically incorporates sustainability into their business. Therefore, it is not surprising that Pierre asserts that he includes sustainability in his work. He does so through attempting to embed sustainability into the culture of the company, so that every decision takes into account sustainability.

Pierre suggests meanings of design and sustainability that align with categories from Chapter four, namely B: Design is about the activity of designing and C: Design is about a way of thinking and reasoning. This is shown by comments such as “applying creative and lateral
thinking,” in order “to solve issues normally around solving an issue,” thus implying the complexity of problems with design thinking. His understanding of sustainability relates to category Y: Progressing economic, social and environmental performance and Z: Building relationships between affected parties, as he concentrates on making the “world better for the next generation” and “people working together.”

In summary, Pierre indicates broad meanings of both design and sustainability. He also includes sustainability in his practice of design though a progressive approach of attempting to create a culture of sustainability in his workplace.

**Summary of Sustainability is Included through a Progressive Approach**

This category has depicted the inclusion of sustainability through two different approaches, which are clustered together because of their progressive nature. Sample groups of students and practitioners indicate how they include sustainability through the incorporation of systemic and life-cycle thinking and through enabling sustainability to become part of the culture of the people. In these three different and progressive ways, sustainability can be included in the practice of design.

**Variations between Students’ and Practitioners’ Approaches to the Inclusion of Sustainability**

The two categories, their elements and the descriptive mini case studies presented above show different ways to include sustainability in the practice of design. To facilitate answering the third research question, a comparison of the differences and similarities in approaches between the sample group of students and practitioners is required. An identical methodology to previous sections created the diagram shown in Figure 5.30. Each bar on the chart represents one of the four elements above: 3 (i) Focus on recycling, 3 (ii) Decisions and consequences, 4 (i) Systemic thinking, and 4 (ii) Part of the culture. These also correspond to the four mini case studies, 6-9 (shown in the legend, in square parenthesis).

![Figure 5.30. Diagram showing variations in inclusion of sustainability from the sample groups of students and practitioners](image-url)
The graph shows that the predominant approach to the inclusion of sustainability by both sample groups is through *Focusing on recycling* and also *Systemic and life-cycle thinking*. The students also include sustainability through reacting to *Decisions and consequences*, possibly a result of being on a learning programme with specific marking schedules. This finding was not evident within the sample group of practitioners, however a key finding is that the practitioners include sustainability by embedding it as *Part of the culture* of the business.

Overall, the diagram displays a broad difference in approaches between the students and the practitioners, but it also indicates that sustainability is being incorporated (in different ways) in the practice of design in New Zealand. The differences are explored in further detail in the following section.

**Sustainability can be Included in the Practice of Design in a Wide Variety of Ways**

The two categories presented above (3 and 4) indicate how sustainability can be included in the practice of design. Each approach was contextualised with a mini case study. In order to locate commonalities between teaching and practice, the findings of the two categories reported above are synthesised in Table 5.30. A comparison between these findings and the work of Sterling and Thomas, (specifically the stages of development of sustainability in higher education) link these categories to the first two categories of this fifth chapter (shown in a similar format in Table 5.25). Special emphasis is placed on whether sustainability is treated as integral or separate to design.

Table 5.30.

*Comparison of Mini Case Studies (6-9) to Sterling and Thomas’ (2006, p.355) Stages of Sustainable Education Development (see also Chapter one, Figure 1.2)*

<table>
<thead>
<tr>
<th>Sustainability is included as:</th>
<th>Response</th>
<th>Societal change</th>
<th>Educational change</th>
</tr>
</thead>
<tbody>
<tr>
<td>6    Reactive Recycling</td>
<td><em>Separate</em></td>
<td>‘Bolt-on’</td>
<td><em>Cosmetic reform</em></td>
</tr>
<tr>
<td>7    Reactive Decisions</td>
<td><em>Separate</em></td>
<td>‘Build-in’</td>
<td><em>Serious greening</em></td>
</tr>
<tr>
<td>8    Progressive Systemic thinking</td>
<td><em>Integral</em></td>
<td><em>Rebuild or redesign</em></td>
<td><em>Wholly integrative</em></td>
</tr>
<tr>
<td>9    Progressive Part of culture</td>
<td><em>Integral</em></td>
<td><em>Rebuild or redesign</em></td>
<td><em>Wholly integrative</em></td>
</tr>
</tbody>
</table>

The findings indicate a correlation between a reactive approach and sustainability being treated as *separate* to design (6 and 7). Similarly, a progressive approach can be associated with sustainability being treated as *integral* to design (8 and 9). The findings from the two practitioners (8 and 9) correspond with the findings from two of the mini case
studies (3 and 5) in the previous section. Despite these findings being student and practitioner based, Sterling and Thomas’ (2006) research is a useful guide. For instance a progressive approach that encompasses systemic thinking and building sustainability into the culture of the business reinforces the notion of integrative sustainability thinking. This leads to the conclusion that a reactive approach, that focuses on recycling is similar to a separate approach where sustainability is a ‘bolt-on’ component, thus leading to ‘education about sustainability’. Moreover, a similar reactive approach that is more focused on decisions and consequences could be described as similar to sustainability being a separate approach, yet ‘built-in’ to learning, thus leading to ‘education for sustainability’. In this way similarities between how sustainability is incorporated into the teaching of design can be linked to how sustainability is incorporated into the practice of design.

On the whole, findings show different approaches to including sustainability into the practice of design. Findings also indicate connections between including and integrating sustainability into practice and teaching. The following section synthesises the findings from the two results chapter (chapter four and five) and discusses how different meanings of both design and sustainability (contextualised in the mini case studies) can affect the different approaches to sustainability identified throughout the chapter.

**How Different Meanings can Affect Different Approaches to the Inclusion of Sustainability in the Teaching and Practice of Design**

In this fifth chapter, I have presented four categories and nine mini case studies to illustrate specific meanings derived from Chapter four, thus contextualising the nine approaches described in each element. Commonalities between these meanings and the different approaches are identified and discussed below.

The third research question concerns the effect of different understandings of design and sustainability and how the latter can be included in the former. In order to address this particular question, the understandings identified in Chapter four are compared to the approaches described above. Analysis of the findings relating to the teaching of design indicate that, although three distinct approaches to the specific inclusion of sustainability are distinguished (see mini case studies 1, 2 and 3), two of them (mini case studies 1 and 2) imply that sustainability is separate to design. Two distinct approaches can be described as indirectly including sustainability in the teaching of design (mini case studies 4 and 5). Similarly, where sustainability is indirectly included in a general design degree as a component and not included throughout, sustainability is also treated as separate to design (mini case study 4).
The analyses of the findings relating to the practice of design indicate a correlation between a reactive approach and sustainability being treated as separate to design (mini case study 6 and 7). Similarly, a progressive approach can be associated with sustainability being treated as integral to design (mini case study 8 and 9). Moreover, analysis shows findings from the practitioners correspond with some of the findings from the educators. Here, the proposition is that if the meaning of design is broad then the understanding of sustainability may also be broad and subsequently a progressive approach to integration is achieved.

As a result of this analysis, a link between a pragmatic view of design, an understanding of sustainability as conserving what is currently available for future generations, and including sustainability as a separate, bolt-on component of design is evident. In contrast, a broad view of both design and sustainability can be linked to sustainability being embedded throughout design.

As proposed in the previous chapter, some ways of thinking about both design and sustainability share common elements. From the analyses of how sustainability can be included in the teaching and practice of design further commonalities can be identified. Table 5.31 builds on the findings discussed in Tables 5.25 and 5.30. The mini case studies have been re-ordered to facilitate comparison and interpretation. Table 5.31 distinguishes between approaches, type of degree or business and whether sustainability is separately or integrally included. Sterling and Thomas’ (2006) stages of sustainable education development are also shown in order to compare with ways of thinking about design and sustainability identified earlier. Emphasis is placed on the last row, which shows differences between single-issue and interrelated and complex ways of thinking.

Table 5.31.

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Findings from Chapter four compared with findings from this fifth chapter show commonalities between meanings are evident. The first commonality is shown on the left-hand side of Table 5.31, where some reactive approaches to including sustainability are consistent with ways of thinking about design as an outcome and about sustainability as conserving the environment (highlighted in Table 5.31 in yellow). Similarly, other reactive approaches and some indirect approaches to including sustainability are consistent with ways of thinking about design as an activity and about sustainability as progressing economic, social and environmental performance (highlighted in the table in red). These approaches and ways of thinking indicate that sustainability is included in the teaching and practice of design as components of a general design degree (highlighted in orange), and in many ways reflect Sterling and Thomas’ ‘education about sustainability’ (highlighted in orange) as opposed to a more integrated approach (highlighted in purple and blue). Thus meaning that single-issue ways of thinking about design and sustainability can be identified (also highlighted in orange). This particular way of thinking can be explained as:

We have in the United States what is called Single-Issue Politics, it means that group coalesce around single issues like gun control, abortion etc. It is a polarising matter, particularly for politics. It is important not to get caught in this single-issuer political position, because things [associated with sustainability] are very much complex and interconnected (Evan).

Here, single-issue ways of thinking can polarise how individuals approach complex problems. That is to say, this type of thinking is more appropriate for tame problems, but not the complex ones associated with sustainability (Buchanan, 1992; Conklin, 2006; Klein, 2004; Neumeier, 2009; Palmer et al., 2007; Wahl & Baxter, 2008).

A further commonality is where sustainability is specifically included in a special design degree (highlighted in pink), which correlates with Sterling and Thomas’ ‘education for sustainability’ (also highlighted in pink). Findings on the right-hand side of the table indicate progressive, specific and some indirect approaches integrate sustainability throughout a general design business or degree and in this way connect to Sterling and Thomas’ ‘sustainable education’ (highlighted in blue). These types of approaches (pink and blue) indicate sustainability is included throughout design (highlighted in purple) and are consistent with ways of thinking about design and sustainability that focus on thinking and reasoning, and building relationships (also highlighted in purple). In other words, where sustainability is included throughout the teaching and practice of design, the ways of thinking about both (design and sustainability) can be identified as more complex and interrelated (Bould, 2009a). However, an important difference between these approaches can be identified in how sustainability is separate (highlighted in brown) or integral (highlighted in green) to design, which is a finding that is explored in greater detail in the last chapter.

Furthermore, my findings support Sterling and Thomas’ suggestion that moving from education about sustainability, through education for sustainability to sustainable
education leads to sustainability being wholly integrative. However, I disagree with their proposition that it is always necessary to rebuild or redesign curricula in order to reach this particular goal (S. Sterling & Thomas, 2006; I. Thomas, 2009). Rather, my findings indicate that sustainability can be indirectly incorporated throughout education (specifically in the discipline of design) due to common elements between design thinking and ways of thinking about sustainability. As the analyses of findings show, underpinning this research study is the notion that sustainability can be inherently included throughout the teaching and practice of design because of the creative and exploratory nature of designers.

**Summary and Conclusions**

This fifth chapter has predominantly addressed the second and third research question by focusing upon four rich categories depicting how sustainability can be included in the discipline and profession of design. Each category is of differing size and complexity, and contains elements of varying depth, all of which were established from data taken from participants’ interviews.

On the whole a wide range of approaches to the inclusion of sustainability are evident from the four sample groups of designers. Analyses indicate how a narrow understanding of design can, but not always, lead to a narrow understanding of sustainability. This rule, however, does not mean that sustainability is not included in design; instead, it means that sustainability is included separately from design. In this way, sustainability becomes an add-on to design, often as a single-issue problem, leading to reactive single-issue ways of thinking.

I suggest that including sustainability throughout the education of designers and throughout the profession of design is a much better approach than adding components of sustainability to existing teaching and practice. Moreover, underpinning this research study is the notion that sustainability can be inherently included throughout design because of the nature of designers and design education. These specific findings begin to address the research problem. Despite a lack of understanding of the depth and breadth of sustainability and the complexity of its interrelationship with design, results indicate that in this island country of Aotearoa sustainability is being included in design education and the design profession in multiple ways.

In conclusion, the integration of sustainability in the teaching and practice of design can be restricted if sustainability is treated as a separate entity to design. In New Zealand, I have found that addressing sustainability and design as separate is a more common approach than the integral understandings and approaches demonstrated by the sample group of experts. In Chapter eight, I further discuss the implications these differences in thinking have on approaches to inclusion. Questions arise as to the specific differences between the drivers for the sample groups of experts as compared to the teachers, students
and practitioners. Moreover, if the experts have experienced barriers, are they comparable to those experienced by the remaining sample groups? These questions are addressed in the following two chapters; the first (Chapter six) focuses on the drivers, and the second (Chapter seven) on obstacles to inclusion.
CHAPTER SIX
RESULTS: VARIATIONS IN DRIVERS FOR INCLUDING SUSTAINABILITY IN THE TEACHING AND PRACTICE OF DESIGN

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   V (ii) Interested in adaptability or ways which we can change .......................................................... 218
   V (iii) It is just intellectually stimulating .......................................................................................... 219

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Introduction

The previous chapter focused on variations in designer’s approaches to the inclusion of sustainability in the teaching and practice of design. The conclusions to that chapter complement findings from Chapter four. Results indicate that a variety of approaches to the inclusion of sustainability in design are evident; some are specific to experts and teachers, while others are specific to students and practitioners. Common throughout each, however, is the way design and sustainability intersects, some imply they are separate, others indicate they are integral to each other. Importantly, the variations of meanings identified in Chapter four do affect how sustainability can be included in design, as diverse approaches derived from the data show the influence of interconnected design thinking on the integrated inclusion of sustainability. For example, if sustainability is understood to be plagued by complex and interrelated ‘wicked’ problems (Bould, 2009a; Buchanan, 1992; Conklin, 2006; Klein, 2004; Palmer et al., 2007), then inclusion into the teaching and practice of design is integrated through a general design degree or taught separately in a specific, but thorough sustainable design degree. For the students and practitioners, this way of thinking and reasoning leads to a progressive approach to sustainability, including systemic thinking and integration into the culture of the business.

On the other hand, if design is understood to be either an outcome or an activity, but not a way of thinking, then meanings of sustainability are also often limited. Thus, leading to design and sustainability being treated as separate; in turn, this leads to the inclusion of sustainability through a more reactive approach or as an add-on component.

The current chapter (six) builds on these findings by exploring why some of the sample groups of designers include sustainability in design, thus addressing the fourth research question. As described in the research methods (Chapter three), a pragmatic grounded theory and constant comparative approach was used to analyse and categorise data, which led to the emergence of five key categories. These are listed in Table 6.32.

**Table 6.32.**

<table>
<thead>
<tr>
<th>Professional drivers include:</th>
<th>Personal drivers include:</th>
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<tr>
<td>I: …professional responsibility</td>
<td>III: …lifestyle influences</td>
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<tr>
<td>II: …the influence of others</td>
<td>IV: …personal responsibility</td>
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<td></td>
<td>V: …sustainability is important, interesting and intellectually stimulating</td>
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</tbody>
</table>

Each category is constructed from interrelated elements obtained from the data analysis process. The categories are explored separately in the next two sections. The first section addresses professional drivers, and the second examines personal drivers in terms of why individuals include sustainability in the teaching and practice of design. Both sections
describe the overall meanings of the respective categories, followed by in-depth explanations of the contributory elements. Exemplar statements from the participants are used to illustrate the categories and the interrelated elements.

A comparison of findings is discussed at the end of the section, which both complements and diverges from existing drivers in the literature. Emerging from the discussions is the concept that different drivers can be characterised as due to a necessity or an opportunity. A diagrammatical graph is used to show the proportions of the sample groups of experts, teachers, students and practitioners who indicate particular drivers. Specific patterns are discernable and show distinct similarities between the experts and teachers with regard to their personal drivers, which are juxtaposed with the professional drivers. The latter exposes experts being driven in vastly different ways to the other three sample groups.

### Professional Drivers for the Inclusion of Sustainability in the Teaching and Practice of Design

The aim of this section is to explore the professional drivers associated with the inclusion of sustainability in design education and practice. Are there patterns or specific reasons that differentiate the four sample groups of designers, specifically in terms of their profession? The results provide a foundation for comparison with the findings from the next section and the previous chapter. Accordingly, this section focuses on two distinct categories and their interrelated elements with regard to the professional drivers for including sustainability, gained from the data. These are listed in Table 6.33.

Table 6.33.

*Four Elements (each) Create Two Categories of Professional Driver*

<table>
<thead>
<tr>
<th>I: Professional responsibility as a driver for inclusion:</th>
<th>II: The influence of others as drivers for inclusion:</th>
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<tbody>
<tr>
<td>(i) If I do not do this, I do not know who will</td>
<td>(i) It has to come from government policy</td>
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<td>(ii) We need to be more accountable</td>
<td>(ii) Forced down the track</td>
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<tr>
<td>(iii) Finding a niche</td>
<td>(iii) Support from a sustainability champion</td>
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<td>(iv) It makes sense within the market</td>
<td>(iv) Experts opened up questions</td>
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</table>

Each category and its interrelated elements are described below. The first category focuses on the academic responsibility associated with sustainability; the second relates to the influence of others, specifically in terms of the chosen occupation of the sample groups of designers.
I: Professional Responsibility as a Driver for Inclusion

In this category, the focus is on the drivers associated with the teaching and practice of design. Notably, when asked why sustainability is important, Ted asserts “[i]t was important to me because I wanted to fulfil a block, block up what I perceived as a gap in the curriculum.” Similarly, Eve reports “so I have to find my niche. I had to find something that no one else felt comfortable teaching,” and Evan argues “[d]esign is making things right – morally right and socially right.” Terry, on the other hand, suggests that “[it] makes sense within the market to be visibly delivering” sustainability. Therefore, this category is concerned with the driver that (i) if I do not do this, I do not know who will, (ii) we need to be more accountable, (iii) I have to find my niche, and because (iv) it makes business sense to be delivering sustainability.

I (i) If I do not do this, I do not know who will.

In this case, a driver is revealed as the participant recognising a need and filling the gap due to feeling responsible. For example, Eddie argues that his particular institution “has in the order of 120 faculty members in it, 120 Professors and my guess is that maybe there are five [individuals] that care about sustainability out of that 120. So there is a real need for this.” Eve opines that “[t]here are so many kids who are at the perfect age to be influenced;” she continues, “[i]f I can teach them something that they can do that is really powerful and makes them feel really good about themselves, I should do it and nobody else is doing it.” Eve has identified that there is a need for sustainability, others are not fulfilling that need and she feels responsible to do something about it. Similarly, when asked why he includes sustainability, Ted asserts:

Because I felt that students needed to have explicit, because it needed to be, this is a topic that they are told about all the time in the media and they know that it is an important thing that designers should actually care about, but as the curriculum used to be taught here there was no explicit lecture at all or course that taught the students the literature or whatever that already exists, other people’s thoughts on this subject, they were just supposed to know. And every single product project they should do, they should already incorporate that kind of ethical, those rules into their projects, so my approach was just to give them explicit knowledge on this subject.

In the same way as Eddie and Eve, Ted saw a need and an opportunity to include sustainability when teaching students. However, Eric focuses more on the wider population, suggesting:

One of the reasons I am in education is because it is one of the hugest problems, especially in the US, is education about the sense of care. I go to the grocery store with my own bags and I am the odd person out. It is not the case in the rest of the world but definitely here. There are occasions where, I always love to tell this story, I go with my own bags and often, not often but sometimes, the person who is putting the groceries in a bag, take my bags and put those in a plastic bag and then put the groceries on top. They do not even know that they should use the bags that I have brought there. Do I blame the person who is doing this? Well, yes, I could but it is a larger systemic problem, it is lack of education. People just do not know that using
these plastic bags is a big problem. They just don’t know. Education is key. So if I can start teaching these students early on, these people are nineteen or twenty years old, about the need to be careful about how you do design, also about how you live your life. I can have a much larger impact. That is why I am in education. I think I can institute change in a much larger way than I could by just doing my own thing.

Eric indicates that being involved in education is a way for him to affect change by providing sustainable education that he currently concludes is missing. These examples summarise the inclusion of sustainability due to designers recognising a specific need and filling it.

I (ii) We need to be more accountable.

Emerging from the data is how some participants are involved in sustainability because they recognise a level of responsibility that they feel they must uphold, due to their role as a designer. For instance, Elaine argues “I believe we need to be more accountable of man-made products and infrastructures.” Similarly, Evan suggests he is involved in this field “because it is a fundamental problem, simple as that. It is interesting to me that designers have been deeply implicated in a consumer culture.” Elizabeth explains “I think that design has great power, there comes a point when that power has to be harnessed;” she clarifies, “I don’t want to say the forces of good versus the forces of evil,” but she indicates a certain level of responsibility associated with being a designer. That is to say “as designers [we have] a professional capability to deal with quality, to make things look better, be better and behave better” (Elsie). Similarly, Thomas suggests designers have a responsibility in their designing and products “shouldn’t be something that’s going to leave the place in a worse state after it’s used than when it came into the world.” Moreover, Eugene indicates:

…it is the engineers and designers who are the ones who create the artefacts that then get mass-produced and one little decision that they make gets multiplied by one hundred thousand duplications of that product and it’s a big impact.

Eugene, alongside the other participants, indicates that designers have a responsibility. This driver can be summarised as an individual’s recognising and fulfilling a level of responsibility and accountability in their role as a designer.

I (iii) Finding a niche.

The first element within this category concerned identifying a need and filling it, and the second concentrated on a level of responsibility associated with being a designer. This element focuses on participants recognising their own niche within their chosen design profession. For instance, Pam explains:

For the company, it means finding a niche, you know, and, you can think about it two different ways. You can actually look at sustaining the company in the long term or you can look at it, how the company affects the others around it as well. I like to look at it, well both of them actually. That’s what I’m doing for my thesis.
Pam is a practitioner and also a post-graduate student, and she postulates that a company has to find its own niche in order to differentiate itself from others. The business in which she works has embraced a philosophy of sustainability, which is a niche she has distinguished and which she is studying for her thesis. Therefore, this example indicates that a driver to include sustainability in the profession of design is the fact that designers can carve out their own particular niche.

I (iv) It makes sense within the market to be visibly delivering sustainability.

In this case, participants indicate they are driven to include sustainability in the teaching and practice of design due to market demand. For instance, Terry asserts he is including sustainability for specific reasons, and “[o]ne is from a commercial or from a brand perspective, it makes sense within the market to be visibly delivering that.” Moreover, Talbot states:

I think that in some markets, there’s probably a marketing edge there. So if there’s a green product over another product and they cost the same amount of money, people are leaning towards the green product because it makes more sense, in public opinion polls and stuff. So people will go for it.

These examples indicate that there could be a competitive market advantage to including sustainability in both teaching and practice. Moreover, Taz reflects:

...sustainability, or whatever you care to call it, as an issue is going to be embedded in everything. It is going to be in school education, it is going to be a tacit understanding, it is going to be explicit in lots of places but it is going to be something that people live with, I think that is going to be inevitable.

Notably, Taz indicates a driver for including sustainability in the teaching of design is the fact that eventually it is going to be explicitly taught; in other words, he might as well be ahead of the curve. Thus, this element is concerned with how it makes business sense to be seen to be delivering sustainability.

Summary of Professional Responsibility as a Driver for Inclusion

This category highlights how some of the sample groups of designers are motivated to adopt sustainability due to professional drivers specifically associated with their profession of design. The first is that there is a real need for this subject, particularly because others are not teaching it. Another is that designers have an overwhelming feeling of responsibility; a third driver involves the designer finding his or her own professional niche. Lastly, there is the theory that it makes business sense to be seen to be including sustainability within the discipline of design. The next category considers how other people can influence ways of thinking about sustainability within design.
II: The Influence of Other People as Drivers for Inclusion

The previous category focused on professional responsibility to include sustainability in the teaching and practice of design, imposed through an internal drive to do better. This second category concerns external influences; for instance, Pierre asserts that “[p]eople understand the issues and they’re happy to talk about it, but not enough people are doing stuff outside of the meetings. So they’re not accountable and there’s no incentivisation either.” Pierre argues that there is a need for individuals at the top to be accountable for sustainability, thus increasing (i) top-down pressure, alongside a need for more incentivisation and (ii) a bottom up approach to sustainability driven by clients or students. Pierre’s position is “[s]upporting the company with sustainability issues,” which ties in with the next element, namely (iii) support from a sustainability champion. These elements demonstrate external support, which is also supported by other people from the sample group of designers. Lastly, resources from (iv) researchers and experts open up questions and encourage the seeking of answers and solutions. These elements are explained in the following subsections.

II (i) Sustainability has got to come from government policy and international pressure.

This element concerns how designers are including sustainability within design due to pressure from the top. It is not necessarily the designers’ choice to incorporate sustainability; it is often due to pressure specifically from government or management. The type of pressure can be varied, for example, “compliance with policies or sustainable laws” (Percy), “international pressures” (Simon), or CEOs being “philanthropic” (Pierre). Simon, for instance, indicates:

[Sustainability has] got to come from all the different, all different aspects and, okay, the government policy is driven, to some, by some extent, by what people want, obviously. So it’s got to come from them as well but I think international pressure’s got a lot to do with it as well.

In his example, Simon is not definitively arguing that sustainability can only be introduced via a top-down approach, but he does imply that it is a factor. Polly also indicates governmental pressure will assist with the inclusion of sustainability in design “I think [the] government needs to maybe make sure there are processes for recycl[ing] for [electronic goods] now and involve [our company] in that.” Talbot agrees, stating:

I mean I think that the corporation, when they finance things or when they, you know, make mission statements and things and, they’re the ones that have absolute control. I mean if you want to be a sustainable company, make sustainable products, you know, then it has to come from the top.

Simon and Polly indicate that sustainable decisions have to come from a governmental level, while Talbot argues that corporations and finance companies have the
final say in making decisions. Paddy suggests “what it takes is an understanding at a management level, an understanding of the needs and how the business could change and see the benefits of it.” Thus, Paddy indicates that a business is not going to move ahead with the inclusion of sustainability if management cannot see the advantages. Percy explains that, within his company, management can see benefits and therefore attempt to exceed some standards in order to advance business potential. He argues:

…the first stage [of trying to be sustainable] is make sure you are complying. The second stage is, you know, cutting the waste and you have to build up and in a lot of areas we are in the first stage and in a lot of ways that is what [our environmental manager] has been trying to do really. Comply with our emissions and all that so we are just trying to get ahead of the law, so the management has to take it on as well.

In his example, Percy indicates that, in order to stay ahead of the competition, management chooses to adopt environmental policies and “get ahead of the law,” which is still driven by the legislation. These examples explain how the inclusion of sustainability can be driven from the top-down, whether it is through the enforcement of government or international policies or due to management pushing initiatives.

II (ii) Forced down the track by clients or students.

In this case, the focus is on sustainability being driven by a bottom-up approach. With regard to the practitioners, this implies that the clients drive the practice of sustainability; for instance, Percy indicates his company was “forced down the track” of using a particular sustainable material by a specific client, even though it was not what the company had planned. In agreement, Phelps (from the same company) indicates the client “had someone bring a report out saying [a particular material] is a better product to use.” Pierre argues the importance of “taking into account all of those various stakeholder wishes” in order to educate sustainability within the business and, similarly, Thomas indicates how he has included a sustainable project because the student body requested it from the Head of Department. He states:

Yeah, well, the funny thing is, is that, like the projects I’ve run, like I think I ran the first one, industrial design here, that was specifically on sustainable design and I was quite interested. It wasn’t what I intended to do with this project, with this paper that I had because I had something else I’d been thinking about but, what happened was, the student body approached the Head of the Institute and said, we would really like to do something in this area and so the Head of the Institute met with me and said, I’d like you to do it. It would be 2003. I’m pretty sure and it was great. The students really enjoyed it. And we learned heaps and I learned heaps too and that was really good.

Thomas suggests that the “student body” drove the inclusion of sustainability within the industrial design course that he taught. He also implies how much he learnt from running the course. Trevor, however, indicates that it is possible for one particular student to drive sustainability objectives; he reports:
[Student X is] one of those once-in-five-year students...So he’s a very intelligent guy, very driven. You know, he drives that studio group and so he’s really one out of the box. But just looking at what he’s done, it’s added another layer to this institution, you know, to the School of Design and it’s really to be commended and I think he’s done it without a huge amount of support. He just got off his bum and did something he was really passionate about.

Trevor, in this example, implies that student X has driven projects through his passion to see change, especially in relation to “collaborative and open source design,” thus indicating pressure from the bottom-up. Tait argues “I think the students are generally interested. I think we have a generation of students that are fundamentally very interested in sustainability.” From this viewpoint, Thomas, Trevor and Tait all indicate how passionate students can drive the inclusion of sustainability in the discipline of design. Likewise, Percy, Phelps and Pierre suggest passionate clients can drive the inclusion of sustainability within a design practice.

II (iii) With support from a champion for sustainability.

A driver for the inclusion of sustainability can come from the support of a peer or colleague. For example, some designers mention support from a “champion for sustainability” (Tait), or an “environmental manager” (Peggy) helps them to address issues of sustainability within design. Practitioners from one company indicate that their environmental manager “keeps us very focussed on those [sustainability] questions” (Pauline). Pedro illustrates a different supporting role from this type of position, stating:

...it’s good to have someone like [our environmental manager] sort of doing little things to help, you know, like downstairs he replaced the cutlery, the plastic cutlery with metal stuff, until some of it went missing (laughs)...That was good and actually, [name of another colleague] is quite good too [in terms of sustainability]. He realised that they were using PVC plastic to wrap the food and got them to change what brand they were buying to use polyethylene or something like that instead...Yeah, because it’s people like us that need to learn these things, as designers, I think. We need to, yeah, it sort of stems from us so there’s no use coming up with something that’s going to be bad for the environment.

In his example, Pedro implies how designers within the company learn from the positive reinforcement of two other members of staff, both of whom “are quite good” in terms of sustainability. Percy indicates a further role of a sustainability champion, stating he works closely with the environmental manager in order to make better choices for the products. He argues:

That is the hardest thing, really, is because there is never a right way really, when you are talking about efficient materials and one has a higher energy content than the other but you can do other things with one that you can’t do with the other then that is really debateable when you argue which way is the right way. You want to choose a material that doesn’t have an energy content, but they all do. I suppose wood is the least, maybe, but then you have to work out where it is going to come from and if it is being replanted. It is an extremely difficult choice and we worked on both of those, we worked with [our environmental manager and another expert] on making sure we were selecting a reasonable product.
In his example, Percy indicates how challenging it can be to choose sustainable materials; he implies the necessity of a sustainability expert to facilitate these challenging decisions. Therefore, these examples indicate how the active support of a peer or colleague who is passionate about sustainability assists other people in including it in their own work.

II (iv) Experts open up questions and encourage the seeking of answers and solutions.

The last element within the category focuses on how designers are primarily motivated to include sustainability by inspiration gleaned from leading researchers, which develops their desire to advance their own knowledge. For example, Sandra reports:

*Cradle to Cradle* [(McDonough & Braungart, 2002)] was the first book that I read about sustainable design and that kind of opened up questions. It made me ask a lot of questions of myself and of others and of systems and things like that and I thought that was really good because it, I’ve read it a few times now because I find I don’t get everything the first time you read something or watch something but I think that book, I think more than anything, it forced me to ask questions and to seek answers and solutions.

For Sandra, the research about the cyclical nature of the cradle-to-cradle process collated in the book by McDonough and Braungart was unexpectedly enlightening; she explains how reading it a number of times “forced” her to “seek answers and solutions.” The book has had similar effects on other participants; Steffen indicates “[a]lthough it’s a bit cheesy, I thought that *Cradle to Cradle* was actually quite inspirational.” Many other participants also refer to being inspired by this particular book (Eve, Peggy, Percy, Sheila, Taz, Trevor, Thomas and Todd). Trevor explains:

Victor Papanek said we should all just stop but that isn’t going happen so if you get involved and become part of the next generation of sustainable product designers and practice and become part of the evolution of product design and industrial design, the creation of new artefacts that don’t damage the environment, damage people’s health and can be returned to the earth, returned to the sea, returned to the air and even, if you believe cradle-to-cradle enhances the environment.

In his example, Trevor moves from Papanek’s chastising of industrial designers to reporting positive inspiration gleaned from McDonough and Braungart’s book. Despite the lambasting of their profession, Victor Papanek and his books *Design for the Real World* (1971) and the *Green Imperative* (1995) remain hugely influential for Earl, Edmond, Elaine, Preston, Sheila, Ted, Trevor, Terence and Trent. Trent indicates he spent:


These leading researchers, sought by Trent for their inspirational qualities, are influential within the field of sustainability and design. Moreover, Evan indicates “Al Gore’s film *Inconvenient Truth* (successor to the book, 2006), whether you like it or not, does an
effective job of raising people’s consciousness about this problem of Global Warming.” Talbot mentions that the “Okala Guidelines [(White et al., 2005)]” are easy to use; Ted reports using “a book by Anne Thorpe [(2007)] called The Designers Atlas of Sustainability.” These examples indicate one or more leading researchers have inspired some of the sample group of designers, thus expanding their own knowledge of sustainability, and its relationship to their profession.

Summary of the Influence of Other People as Drivers for Inclusion

From the data, four interrelated elements are found that are categorised as an influence by other people. In this instance, influence comes from the top-down as pressure from government policies or legislation, or from the bottom-up and is driven by clients or students. Furthermore, sustainability can be included as a result of passive support; for example, through the influence of leading researchers in the field. Lastly, a final professional driver for sustainability is in the form of the active support of a champion, who is an expert or motivated individual who can keep other people on target.

Professional Drivers can be a Necessity or an Opportunity

This section has focused on a variety of professional drivers which influence the inclusion of sustainability in the teaching and practice of design. Similar to the previous categories representing the meanings of design and sustainability in Chapter four, these two categories (I and II) also complement much existing sustainability literature. These complementarities and differences are discussed below.

The focus of category I: Professional responsibility as a driver for inclusion focuses on responsibility and reflects aspects of recent research. This is specifically reflected in some environmental and quality management literature (Y. Chen, 2008; Isenberg, 1997; Visser & Crane, 2010), where technical sustainability managers are driven to reach their goals through professional accomplishment (Visser & Crane, 2010). The concept that some businesses include sustainability due to the desire to gain a competitive edge in the market is common within the literature (Argument et al., 1998; Lewis et al., 2001; S. Walker, 2010). In other words, it makes business sense to include sustainability, because “if we don’t do it someone else will” (S. Walker, 2010, p. 168). In doing so, businesses can position themselves as market leaders and innovators (Lewis et al., 2001) and those who do so often recognise the progress of new economic opportunities (Bansal & Roth, 2000), a profitable business model and new competitive terrain (Lewis et al., 2001). For some companies, the move towards the inclusion of sustainability can reinforce a responsible, caring image for the business (Argument et al., 1998). In summary, some of the elements of this driver are found within the business world.

Category II: Influence of other people as a driver for inclusion relates to external support or influences that are drivers for the inclusion of sustainability and this is evident in some
leadership literature (Greenleaf & Spears, 2002; P. M. Williams, 2008). In particular, team development (Visser & Crane, 2010) and compliance with regulations and legislations are key drivers (Bansal & Roth, 2000; Buchan, Spellerberg, & Blum, 2007; Dangelico & Pujari, 2010; Post & Altman, 1994). Similarly, pressure from stakeholders to be more ecologically responsive is also shown to be an external influence (Bansal & Roth, 2000; Charter & Tischner, 2001), as is pressure from student demand within institutions (Boyle, 1999; Hagan, 2003). Research shows that businesses which are considering environmental issues do so in order to act responsibly, to influence policies and regulations, to strengthen technical competence and/or because they want to change or improve the market image of their company (Lewis et al., 2001; Post & Altman, 1994). Moreover, ethical motives are a factor in why some businesses become more environmentally conscious (Bansal & Roth, 2000; White et al., 2005), specifically when companies have the foresight to realise they must use resources responsibly to help maintain the health of all environments over the long-term (White et al., 2005). Thus, the elements from this category are also found in recent research.

Key epistemological differences between the literature and the current findings are identified when exploring commonalities between the different professional drivers. Table 6.34 provides a summary of the drivers, with a special emphasis on the commonalities: necessity and opportunity.

Table 6.34.

Commonalities in Different Professional Drivers for Sustainability

<table>
<thead>
<tr>
<th>Category:</th>
<th>Driver</th>
<th>Sustainability is a:</th>
</tr>
</thead>
<tbody>
<tr>
<td>I: Professional responsibility</td>
<td>(i) If I do not do this, I do not know who will</td>
<td>I: Necessity</td>
</tr>
<tr>
<td></td>
<td>(ii) We need to be more accountable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(iii) Finding a niche</td>
<td>I: Opportunity</td>
</tr>
<tr>
<td></td>
<td>(iv) It makes sense within the market</td>
<td></td>
</tr>
<tr>
<td>II: Influence of other people</td>
<td>(i) Sustainability as got to come from government policy</td>
<td>II: Necessity</td>
</tr>
<tr>
<td></td>
<td>(ii) Forced down the track</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(iii) Support from a sustainability champion</td>
<td>II: Opportunity</td>
</tr>
<tr>
<td></td>
<td>(iv) Experts open up questions</td>
<td></td>
</tr>
</tbody>
</table>

Two commonalities are noted between the elements of these two categories. The first is the grouping of drivers that could be described as being out of the hands of the individual themselves; in other words, a necessity rather than the second commonality: an opportunity. Notably, Ted asserts “I felt that students needed to have explicit information” which indicates circumstances surrounding the driver as needs-based (such as: I (i) If I do not do this, I do not know who will), meaning Ted felt that including explicit information for the students was a necessity. In a similar way, Thomas reports “the student body approached the Head of the Institute,” indicating how the students proactively drove the need for sustainability in
their education, which subsequently forced Thomas into teaching the subject (such as: II (ii) *Forced down the track by clients or students*). That is to say that these types of drivers share the notion that sustainability is not a choice, but a necessity. Alternatively, the element: I (iv) *It makes sense within the market to be visibly delivering sustainability*, is a driver that indicates an opportunity is seized, in much the same way as: (iv) *Experts opened up questions and encouraged seeking answers and solutions*.

On the whole, two categories discernable from the data are recognisable within the literature; yet, important methodological differences reveal that drivers for the inclusion of sustainability are either a necessity or an opportunity. The significance and relevance of these variations found between the four sample groups of designers is explored in the next subsection.

**Variations between Designers’ Professional Drivers for Sustainability in Design**

In the previous section, the two categories that arose from the sample groups of designers were explained in detail through a number of interrelated elements. Each of these elements is a distinct driver and conclusions can be drawn from these findings to indicate that sustainability can be included in design for a variety of professional reasons. However, the differences in circumstance associated with these drivers are important. For example, are professional drivers for the sample group of experts underpinned by necessity or by opportunity?

In order to compare the differences in drivers between the four sample groups of designers, it is necessary to recognise common meanings extracted from each of the participants. Accordingly, a diagrammatical graph shows information on each group’s professional driver and its underlying reason; this diagram is shown in Figure 6.31. One bar on the chart represents two of the eight elements of the two categories, as indicated in Table 6.34 as a necessity or an opportunity for I: Professional responsibility or II: Influence of other people.
Figure 6.31. Diagram showing variations between professional drivers from the sample groups of designers

Figure 6.31 shows a broad difference between the drivers for the sample groups of designers. The sample group of experts predominantly indicate a high level of Professional responsibility driven from necessity and not opportunity. On the other hand, the driver: Influence of other people for the experts proves to be due to an opportunity as opposed to a necessity. The sample group of teachers display drivers in each characteristic of the two categories; with a relatively larger number than the experts indicating the Influence of other people is driven by opportunity. The number of practitioners indicating they feel forced to include sustainability through: Influence of other people is a necessity, is equal to those who indicate the same (Influence of other people) but as an opportunity. The students hold similar views to the practitioners, but with fewer contributions.

In summary, vast differences between the professional drivers emerge, both across the categories and between the designers themselves. The significance of these findings is discussed later in the chapter, when these distinct differences are compared with the different personal drivers. Appropriately, the next section focuses on personal drivers for the inclusion of sustainability.

**Personal Drivers for the Inclusion of Sustainability in the Teaching and Practice of Design**

In the previous section, the focus centred on professional drivers associated with the inclusion of sustainability in the teaching and practice of design. In contrast, the drivers explored in this section are personal ones. The findings are compared with those from the previous section at the end of the chapter. Three distinct categories can be reported from the data, which are outlined in Table 6.35.
Table 6.35.

*Three Elements (each) Create Three Categories of Personal Driver*

<table>
<thead>
<tr>
<th>III: Personal responsibility:</th>
<th>IV: Lifestyle influences:</th>
<th>V: Sustainability is important, interesting and stimulating:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) We are paying for problems that do not exist yet</td>
<td>(i) I do not want my kids to grow up in a hideous world</td>
<td>(i) It is important for our whole society</td>
</tr>
<tr>
<td>(ii) We have a strong moral obligation</td>
<td>(ii) Related to your upbringing</td>
<td>(ii) Interested in adaptability or ways which we can change</td>
</tr>
<tr>
<td>(iii) Sustainable living is about values</td>
<td>(iii) I drank the Cool-Aid 100% as a kid</td>
<td>(iii) It is just intellectually stimulating</td>
</tr>
</tbody>
</table>

The three categories are each described below, with their distinct interrelated elements. The first category concerns personal responsibility, the second addresses the influence of an individual’s lifestyle, and the third is the recognition of sustainability as being worthwhile.

**III: Personal Responsibility as a Driver for Inclusion**

Some designers conclude that it is their, or other people’s, personal duty to be involved with sustainability, which is a construct evident from the data. Toby asserts “it’s more of a responsibility, I think, personal responsibility and social responsibility to do that.” Thus, three elements create this category: (i) we are paying for problems that do not exist yet, (ii) we have a strong moral obligation, or (iii) sustainable living is about values.

**III (i) We are paying for problems that do not exist yet.**

The first element within this category captures feelings of fear regarding what might happen if action is not taken. For example, Taylor asserts:

...we can get an accurate computer programme that says, in thirty years’ time, the water levels will be this and we’re at a point now where we believe those computers. So that means we’re taking [sea level rise] seriously which is why we’re now paying for problems that don’t exist yet.

Taylor indicates that we can calculate the impact human beings are having on the planet, which must force action now for the sake of humanity in the future. Elizabeth indicates “I am petrified of what [my son] is going to be exposed to in the world.” She explains:

The idea that 20-100 years down the road that man’s existence on the planet will have obliterated the planet. There is some sort of insight for the planet. The very idea that our existence is detrimental to the planet that we live on troubles me.

Elizabeth indicates she fears that humankind is doomed if we do not change the way we exist. Tait indicates “the footprint of the people on the planet is having more and more
effect on the planet and clearly this is having an effect on the sustainability of the planet.” Alternatively, Trent states “[i]t’s almost like you’ve got to wait until [a suburb of the city] is completely submerged in water until you go, actually, maybe they were right ten years ago.” He argues that waiting is not the answer, that too many people are waiting to see what might happen and he opines that maybe it is already too late to make changes to current levels of unsustainability.

Similarly, Eddie argues “We really have to think about the fact that we now have 6.5 billion people” indicating he is concerned by over-population. Eve’s anxiety focuses on the amount of chemicals we ingest in our food or cleaners, stating “I worry about my dog getting poisoned from the grass. I have stopped using chemicals on the lawn.” She continues, “I try making my own cleaners out of vinegar and water and things like that.” Ernie is concerned that we could find ourselves in an ecological emergency, asserting “we don’t need a huge ecological disaster because then everything gets thrown out of the window.” These examples focus on feelings of fear, which motivate designers to become involved with sustainability.

III (ii) We have a strong moral obligation.

In the first element within the category, becoming involved with sustainability did not arise out of choice, but was driven by fear. Similarly, in this case, the focus is on the concept that some individuals do not feel like they have a choice as to whether or not to become involved with sustainability; this time, however, not through fear, but through an overriding moral obligation. For instance, Tait argues:

I think we have a strong moral obligation to be more and more sustainable. I have no doubt in my mind of that, it is important. We are making more and more product and you do have to question why we are making more product and what reason we are making more product. Some product designers are very much into product. I am not really into product. I don’t have the latest gadget, I don’t particularly want the latest gadget, my cell phone is about five years old. I am reluctant to even have a cell phone. I don’t think there is a need for more proliferation for more and more stuff and I think each individual person has to make a decision as to what level of material things they need with regards to that.

Tait begins by reflecting that individuals have no choice in being sustainable, asserting that “we have a strong moral obligation,” although he clarifies his meaning as the individual’s choice to consume or not to consume, which he indicates constitutes sustainability. Similarly, Toby declares “its our responsibility to the wider community, to the world,” yet Emily, Earl and Ernie take a more serious viewpoint, arguing:

Why do we all do it? I don’t think these guys have a choice. You know, they can fiddle while the titanic goes down but you might as well be ahead of the curve instead of waiting to be pulled along by it (Emily).

Things are pretty bad out there and they are not getting any better. I think especially in the US, we are the centre of the world empire and if we can steer things in a
positive direction we can have a huge influence, not only in the US but internationally. I think what goes on here people take very seriously in the rest of the world. It is like a giant ship, even if we can turn it just a few degrees that can make a huge difference. It is our role! It is the least we can do (Earl).

I think it is important because it is very realistic… fifty years ago we didn’t know that. We didn’t know smoking was bad for you, we thought we could still win wars. We still thought we could eradicate disease, we thought we could conquer nature (Ernie).

Emily, Earl and Ernie all indicate they do not have a choice about being involved in sustainability because the issues are so big and permanent that they feel they have little or no control over the situation. Moreover, they indicate that other people will not have a choice regarding being involved or not in the future. Emerson agrees “I think everyone’s aware of the huge problem of climate change and that we all need to act quickly so I see what I do as contributing to that kind of progress.” Eve claims that she has no alternative course of action in the matter “[t]here really is no other choice – I’m a human being here on earth.” These examples indicate how these designers see the problem as being very significant, yet they indicate they have little option in the matter and must do something. In contrast, the following element explores personal choice.

III (iii) Sustainable living is about values.

A further driver for the inclusion of sustainability reflects personal preference. Eve suggests that “sustainable living” is about “values and valuing the environment, even the littlest thing makes a difference.” Evan, for example, states “down deep the problem has to do with values and the expression of values and how we live.” Terry asserts “it’s probably the right thing to do (laughs).” Trevor argues “I hold a values’ perspective,” he continues:

…it’s an interesting time to be in New Zealand and certainly when I go to the provincial areas, like I visit my brother in the Bay of Islands and I watch, they just put one bin out and no recycling scheme plus car batteries, you know, I just reel when I see it. It’s the funny thing here, I had students from Switzerland on exchange, have a regular number of students from Switzerland. They take home their carbon batteries out of their walkmans and things because they just can’t, they’ve grown up with recycling and can’t, literally feel sick throwing them in the bin and they visit somewhere like The Warehouse and see this multipacks of forty-eight low cost carbon batteries designed to be used for a short time and thrown in the landfill and they just can’t believe it. It’s like the Dark Ages for them. So yeah, we’ve got a long way to go but there’s lots of interesting things happening. So that’s why I like being in education at the moment and sort of helping to get the next generation of product designers to be aware of what they can do.

Trevor’s example indicates the strength of his values and ethics regarding sustainability with the reflexive response that causes him to reel at the lack of recycling facilities in other regions. He reaffirms his own values by adding the scenario of how Swiss exchange students reacted in a similar way. Evan, Eve and Terry (above) also suggest that personal choice of the ‘right’ thing to do is a driver for the inclusion of sustainability. Comparatively, Eddie asserts:
The idea of a sustainability ethic is an important one in which we are basically arguing and asking the question, is it ethical to take resources that we know will make our lives comfortable and use them up so that our children and grandchildren will not be able to use them?

In his example, Eddie contends that sustainability is about ethical decisions, which is reflected in the viewpoints of other designers; for instance, Trent, who indicates sustainability:

...is a balancing act of small actions and small actions consistently and then other things, just moral decisions, like not buying from The Warehouse or building your own raised beds or whatever to plant your own vegetables and cycle to work and stuff like that.

Eddie and Trent focus on “moral decisions” associated with personal choice. Emerson reports that, in his experience, sustainability “ties in with ideas of personal development and personal ethics and citizenship and all of these kinds of things. It is about personal values.” Similarly, Elaine describes including sustainability in an “attempt to reflect values of sustainability which are people and system focused.” However, Elizabeth admits “those are my values” and acknowledges “I am probably being altruistic.” These examples indicate why some of the sample groups of designers choose to include sustainability in the teaching and practice of design. The drivers revolve around choice in relation to personal values and ethics.

Summary of Personal Responsibility as a Driver for Inclusion

This category describes how participants feel personally responsible for the current state of the world and the effects that human beings are having upon it. The elements within the category have captured drivers that are often beyond the control of the participants, such as feelings of fear and overriding moral obligations. Other drivers focus on choice, in terms of personal values and beliefs. The following category is closely connected to the drivers based on choice described here, as it concerns how sustainability can be fundamental lifestyle choices.

IV: Lifestyle Influences as Drivers for Inclusion

Some participants have grown-up in, or are surrounded by, an environment that has positively reinforced sustainability. Ethan, for instance, reports “[a]ll my life I have rattled the bars of my cage, I am one of those sorts of people. So I have never been able to just say, ‘this is all perfectly fine, lets just polish it’.” Three interrelated elements obtained from data create this category: (i) I do not want my kids to grow up in a hideous world, (ii) related to your upbringing, or (iii) I drank the Cool Aid 100% as a kid.
IV (i) I do not want my kids to grow up in a hideous world.

In this case, the element focuses on the choice to protect future generations’ existence on the planet, in some ways reflecting aspects of the previous category III (i) We are paying for problems that do not exist yet. Here, the element concerns influence driven by a more protective nature that is evident from parents. For instance, Terence reports “I don’t want my sons to grow up in a hideous world and I don’t want anybody else’s children to grow up in a horrible world just because stuff could be done and wasn’t done.” Elizabeth asserts she is involved with sustainability “for my children’s’ future,” clarifying that “I fear that if [my son] doesn’t learn [about sustainability] from me he won’t learn it from anyone else.” In this way, Elizabeth reflects aspects of the previous category, but also clearly indicates she is motivated because of her child. Other designers, including Emily, argue sustainability is important because “I have two kids and somebody’s got to do something.” Edmond indicates “I think having children, mine are seven and nine, was quite a cathartic moment and really brought home the notion of intergenerational equality, suddenly you think of your own children.” Similarly, Percy confides that he is “making more of those [sustainability] efforts now that I have got kids.” For these designers, the lifestyle choice of having children and wanting to protect them drives the inclusion of sustainability.

IV (ii) Related to your upbringing.

A further driver evident from the data is that some meanings of sustainability can be related to one’s upbringing. For instance, Preston reports he is “a fairly conservative person in terms of consuming anything,” stating “I think I’ve probably always just been like that.” He argues “[i]t’s also perhaps related to your upbringing and stuff as well. I think my parents were very similar.” Comparably, Santiago explains “my parents, well they’re farmers and they have a really big interest in keeping the farm, and keeping it sustainable and just making sure that you’re not kind of destroying the land for the future.” Preston and Santiago highlight the influence of their families in terms of their understanding and the importance placed on sustainability.

IV (iii) I drank the Cool-Aid 100% as a kid.

In contrast to the previous element is how families do not necessarily influence young people; instead young people can be influential for their families. Emily, for example, indicates how she was involved with sustainable initiatives as a child, stating “I have always been interested in [sustainability]. When I grew up, it was during that great environmental awakening in the US and I drank the Cool-Aid 100% as a kid.” Similarly, Eve asserts:

...back in the 70s I joined a group called the ‘Passaic River Restoration Foundation’. I lived in New Jersey and we had a river that was one of the ten most polluted rivers in the country. So in this group, twice a year we would wear old jeans and sneakers and would wade into the river with work gloves on and pull things out of the river. We found everything, we found appliances, bicycles, rifles, you cannot believe what
we found in there. Now I think about all the diseases that you can get and I am not sure I would do it anymore. But at the time it was back in the 70s it was just when people were starting to think about pollution. So I was into the cause. My friends were too, they were who I would gravitate towards. I remember getting on my parents’ case about ‘why do you use paper towels all the time? Why can’t you just use a towel and wash it so we are not wasting all that paper?’ So I started making my parents get into everything. I think as soon as I left for college they could ignore me. But while I was in high school everybody had to suffer in our house.

Eve explains how determined she was to ensure her family were educated in relevant environmental issues, even stating how she enforced a way of living that her family had to “suffer” through. Trevor gives an example of being “the guy who stops someone in the street and asked them to pick up his cigarette packet,” reporting that he has “always been that way.” These examples show that specific lifestyle choices, even from an early age, can influence the inclusion of sustainability.

**Summary of Lifestyle Influences as a Driver for Inclusion**

This category has focused on the lifestyle influences of some of the sample group of designers. These influences are either recently acquired due to the arrival of children, established due to family upbringing or arise because they came to their own decisions regarding sustainability as a young person. The following category focuses on the recognition of sustainability as being worthwhile, meaningful and interesting as a driver for inclusion.

**V: Sustainability is Important, Interesting and Intellectually Stimulating as a Driver for Inclusion**

This category concerns sustainability being an interesting and worthwhile topic in its own right, thus motivating participants to become involved with the subject. Ernie suggest:

I think the important part now is not to panic. We have gone through the time when people were lecturing and talking about this stuff or discussing this stuff it was almost suicidal. We used to call them suicide slides. Here is a suicide slide of how the world is going to turn to disaster, in other words it makes you want to kill yourself because the world is going to end and it is all going to end in disaster. In the end no one wants to hear that. The issue there is how do we get out of this, how do we make it better?

Ernie reflects aspects of category III (i) *We are paying for problems that do not exist yet* by indicating how there is a looming global environmental problem but he has moved past the fear and the “suicide slides” and found a desire to do something positive. Emerson states “I feel it is worthwhile, in terms of work, it is meaningful.” When asked why he was involved with sustainability, Edmond answered “Good question. I don’t know. It feels right.” Pierre states:
I honestly find them, it might sound cliché but I just find them really interesting issues. You know, I like, at the moment, I’m involved with environmental issues but I’d actually quite like to be involved more with social issues.

Pierre admits how he genuinely finds the issues associated with sustainability and design to be of interest and implies how he has previously focused on the environmental side of design and sustainability, but would like to be more involved with the social side. Three elements create this category; these include the participants’ opinions that: (i) it is important for our whole society, (ii) they are interested in adaptability or ways which we can change, and (iii) it’s just intellectually stimulating. These elements are described below.

V (i) It is important for our whole society.

This element focuses on the participants’ own motivation to include sustainability because of the difference that can be made. For example, Eric and Edmond both argue:

I think it is crucial for all of us to be engaged in this enterprise if we want to make this world a better place, not just for ourselves but for everybody else that lives on this planet. I think it is personally important for me to not be the only person who is making an impact or influencing others (Eric).

I suppose, why it is important to me is that it is important for our whole society. It is a big grand sweeping statement. If we look at it in any way we slice it up, if we look at the evidence, the scientific evidence, the evidence of social wellbeing, the evidence in terms of one planet, one future in terms of limits of population growth, limits of resources, allocation, etc. It is a pretty straightforward conclusion in terms of a better management system if we want to think of it in terms of future generations if we are talking about quality of life (Edmond).

In the examples, both Eric and Edmond indicate the importance of being “engaged in this enterprise” (Eric) because “it is important for our whole society” (Edmond). Eve reflects “I feel like every person counts. It is a bit like voting, you feel like ‘I am just one person – what does it matter’ but if everybody thinks that way then nothing will ever change.” Steffen maintains he “would very much like to be doing [his] own thing and bringing products to market that make people aware, I guess, of sustainable design.” Ethan suggests “along with other people, millions upon millions of people, now I have become aware that there is a system problem out there, everywhere.” By saying this, Ethan is implying that society is becoming aware of problems of unsustainability and therefore something big has to happen and he wants to be involved. These examples indicate that some of the participants want to make a positive difference in the world, and including sustainability in the education of designers is one of the ways they can achieve this goal.

V (ii) Interested in adaptability or ways which we can change.

In this case, the element concerns participants’ interest in adaptability and in the desire to effect changes in other people. Examples indicate that doors of possibility can be opened for other people, who are then inspired to make their own decisions. For instance, Tane indicates he is “more interested in adaptability or ways which we can change;” Pedro
suggests “[w]e need to be able to empower people to want to change and want to make those changes.” Eric argues:

...we need to start thinking about educating consumers, educating people in general, why it is important for you to buy products that says it consumes low energy, or why is it important for you to think of recycled content in something. That is hugely missing. We, as educators, we should start thinking about not just educating these students who are going through but also people who are buying this stuff that we put out there.

Eric indicates the importance of “educating consumers” with enough information for them to make their own sustainable choices. Similarly, when asked why sustainability is important for her, Sandra asserts:

...because I saw it as an opportunity to move forward and I kind of thought that it was this new kind of idea at the time and I wanted to be informed about it just because the issues around it and the things that we were told about our environment and all the kind of bad kind of things were quite concerning and so learning how to make less of an impact or just being aware of the different choices you can make was interesting to me and I kind of see design as a vehicle for that change.

Sandra indicates that she saw learning about sustainability as “an opportunity to move forward,” and concludes by connecting sustainability to design, in particular using “design as a vehicle for that change.” Following on from the previous element, Eve, who argued that an important driver for her is the need to make a difference, continues by indicating how she wants to motivate other people too “even if you can talk to five friends and get them interested and they talk to five friends and they get interested.” Similarly, Elizabeth explains that for her:

...it is important to me that other people at least have exposure to other ways of thinking about the design that they are doing and the meaning that they are making and the impact they are having on the world.

Here, Elizabeth indicates the importance of opening doors for students so they can see the positive or negative impact they could have through their methods of design. These examples indicate that some participants are motivated to become involved with sustainability because they see the positive potential to change current practices and, in doing so, they can enable other people to see future possibilities.

V (iii) It is just intellectually stimulating.

Including sustainability into the teaching and practice of design is suggested as being ideal due to the explorative and innovative nature of the subject. Taylor argues the “primary goal” of a university “is to stretch design boundaries.” Terry asserts “it’s interesting to me. Like it’s just intellectually stimulating so it’s kind of, yeah, keeps the brain alive.” Elaine and Edmond indicate:

At a philosophical level I think this should open up deeper questions about the purpose and role of design and society – when we have these debates with students
many of them don’t get it, ‘we’re here to produce shiny things that people like’ type perspective, but the ones who do engage get a real buzz from opening this new world of possibility (Elaine).

We believe, personally being involved in education is a way and education is seen as one of those cornerstone things of how you progress sustainability. People become informed and aware of their actions and the hidden impacts behind products. If they become aware of that through some sort of education process or even attending a course like ours and learning about it in an undergraduate course, then that is how we go about it (Edmond).

Elaine opines that students are not only in university to “produce shiny things that people like,” but to open a “new world of possibility.” Edmond indicates how being involved in education is a fitting situation for students to become aware of the implication of their design decisions, thus providing the opportunity to “progress sustainability.” These examples show how these participants see the innovative potential of the inclusion of sustainability because it stretches boundaries, is intellectually stimulating, and asks deeper questions.

**Summary of Sustainability is Important, Interesting and Intellectually Stimulating as a Driver for Inclusion**

In this category, three elements depict the fact that designers are driven to include sustainability because it is an important, interesting and intellectually stimulating field of research, education and practice. Some participants want to make a difference in the world and are driven due to its importance. Others indicate they find it an interesting subject and want to enable people to change. Lastly, some participants find sustainability to be an intellectually stimulating and innovative topic that is worthwhile, meaningful and interesting to include in the teaching and practice of design.

**Personal Drivers can be a Necessity or an Opportunity**

Similar to the previous section, categories depicting drivers for the inclusion of sustainability were the focus. The difference in this section is these categories concern personal reasoning. Three categories (III, IV and V) describe a variety of personal drivers and also complement research in sustainability literature. These complementarities and differences are discussed below.

Despite the separate presentation of these categories and elements, there are some commonalities. In general, the categories derived from the participants’ interviews and their interrelated elements find resonance in literature on ethical corporate entrepreneurs (Kuratko & Goldsby, 2004), grassroots social entrepreneurs (Mars, 2009; Myers & Nelson, 2010; Palanithurai, Thirunavukkarasu, & Uma, 2008; Pastakia, 1998), ethical strategy planning (Hosmer, 1994; A. A. Thompson, Strickland, & Gamble, 2009) and ethical consumerism (Carrigan & de Pelsmacker, 2009; Moisander & Pesonen, 2002). For example,
category III: **Personal responsibility as a driver for inclusion** and Category IV: **Lifestyle influences as a driver for inclusion** focus on personal drivers in the pursuit of social and environmental change, through entrepreneurship, planning and consumerism. These types of drivers can be associated with personal values (Post & Altman, 1994; Visser & Crane, 2010).

My findings also show that a further driver for the inclusion of sustainability in the teaching and practice of design is V: **Sustainability is important, interesting and intellectually stimulating**. This category complements literature that draws on strategic thinking (Baumgartner & Korhonen, 2010; Mintzberg & Quinn, 1996; Zand, 2010), integration between cognition and strategic response (Nadkarni & Barr, 2008) and types of change management (Paton & McCalman, 2008; Post & Altman, 1994). Moreover, this driver reflects organisational transformation (Visser & Crane, 2010) and builds on concepts of “autonomy,” “mastery” and “purpose” (Pink, 2010), each of which are recognisable within the elements of the category. For example, V (iii) *It is just intellectually stimulating* reflects aspects of autonomy, which is the desire to be self-directed, and mastery, which is the desire to command knowledge (ibid.). Also V (i) *It is important for our whole society* can be described as giving purpose, which is the altruistic desire to do something positive for other people (ibid.).

Important methodological differences between the literature and the current findings can be discerned when identifying the commonalities between the different personal drivers. Table 6.36 provides a summary of the drivers, with a special emphasis on the commonalities: **necessity** and **opportunity**.

**Table 6.36.**

<table>
<thead>
<tr>
<th>Category:</th>
<th>Driver</th>
<th>Sustainability is a:</th>
</tr>
</thead>
<tbody>
<tr>
<td>III: Personal responsibility</td>
<td>(i) We are paying for problems that do not exist yet</td>
<td>III: Necessity</td>
</tr>
<tr>
<td></td>
<td>(ii) We have a strong moral obligation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(iii) Sustainable living is about values</td>
<td>III: Opportunity</td>
</tr>
<tr>
<td>IV: Lifestyle influences</td>
<td>(i) I do not want my kids to grow up in a hideous world</td>
<td>IV: Necessity</td>
</tr>
<tr>
<td></td>
<td>(ii) Related to your upbringing</td>
<td>IV: Opportunity</td>
</tr>
<tr>
<td></td>
<td>(iii) I drank the Cool-Aid 100% as a kid</td>
<td></td>
</tr>
<tr>
<td>V: Sustainability is important, interesting and intellectually stimulating</td>
<td>(i) It is important for our whole society</td>
<td>V: Necessity</td>
</tr>
<tr>
<td></td>
<td>(ii) Interested in adaptability or ways which we can change</td>
<td>V: Opportunity</td>
</tr>
<tr>
<td></td>
<td>(iii) It is just intellectually stimulating</td>
<td></td>
</tr>
</tbody>
</table>

The same two commonalities (necessity and opportunity) that were noted in the previous section are also found in these three categories (III-V). For example, III (i) *We are
RESULTS: VARIATIONS IN DRIVERS

paying for problems that do not exist yet, IV (i) I do not want my kids to grow up in a hideous world and V (i) It is important for our whole society all indicate a level of necessity with regard to the inclusion of sustainability, which is different to the value perspective, III: (iii) Sustainable living is about values or V (iii) It is just intellectually stimulating. The latter two indicate that sustainability is a choice, and as such can be an opportunity.

In summary, some of the categories that are found within the data complement some drivers found within current literature. Important differences indicate sustainability can be included because it is seen as a necessity or an opportunity. The significance and relevance of the variations found between the four sample groups of designers are explored in the next section.

Variations between Designers’ Personal Drivers for Sustainability in Design

Three categories with varying elements described a variety of personal drivers for sustainability. Again, the differences in circumstance associated with these drivers are important. For example, are personal drivers for the sample group of experts underpinned by necessity or by opportunity? Do they differ significantly to those of the teachers and practitioners? These questions are addressed in this subsection.

Comparing the differences in drivers between the four sample groups of designers means discerning commonalities between each of the participants. The diagram in Figure 6.32 shows each group’s personal drivers and whether they are underpinned by necessity or opportunity. One bar on the chart represents two of the nine elements of the two categories, presented in Table 6.36 as either a necessity or an opportunity for drivers of III: Personal responsibility, IV: Lifestyle influences and V: Sustainability is I.I.I. (important, interesting and intellectually stimulating).

![Diagram showing variations between personal drivers from the sample groups of designers](Figure 6.32)

The bar chart in Figure 6.32 shows more similarities in patterns than that shown in professional drivers of Figure 6.31. The sample group of experts indicate many different personal drivers, and predominantly display a relatively higher level, than the other sample
results: variations in drivers

groups, of **personal responsibility as a necessity** but also as an **opportunity**. The sample group of teachers indicate similar, but fewer, drivers. More experts indicate drivers than any of the other sample groups. An equal number of experts indicate **sustainability is important, interesting and intellectually stimulating** to be a necessity and an opportunity. Few personal drivers are noted for the sample group of students and practitioners, although the latter group (practitioners) indicate some **lifestyle influences** (both necessity and opportunity). Also **sustainability is important, interesting and intellectually stimulating** is viewed more as an opportunity than a necessity.

In short, a wide variety of differences between personal drivers can be identified. Similar patterns are discernable in this diagram, which are radically different to that shown previously. The significance of these findings is discussed in the following section.

**Comparison of Drivers**

A wide variety of drivers are reported from the sample groups of designers. Drivers can be personal or professional, and result from responsibility or the influence of other people. Importantly, drivers can also be due to the concept that sustainability intellectually stimulating. This is a significant finding as the majority of drivers relate to personal values; here seeking an opportunity overrides principles or ethics. A further aim of this chapter was to determine whether there are particular drivers that set the experts apart from the other sample groups of designers. These findings are discussed in this last section.

Results of the diagrammatical comparisons between necessity and opportunity show distinct differences and similarities. The findings for the personal drivers show an almost identical pattern between the sample group of experts and the teachers, although more widespread within the experts. As a result, no major differences were ascertained between personal values for the sample group of experts compared to the sample group of teachers. In conclusion, both sample groups of educators are personally driven in similar ways, and their personal values are alike, although more extensive in the case of the experts.

Juxtaposed with the identical pattern of personal drivers for the sample groups of designers are the dissimilarities found within professional ones. A polarisation between the experts’ and the other sample groups of designers’ notions of professional responsibility is evident. More experts are driven through necessity to be professionally responsible, meaning the experts have a higher value-based conception of sustainability. In contrast, relatively few of the other sample groups indicate they have a sense of professional responsibility and when they do it is more due to identifying an opportunity than necessity. In this way, a distinction between the experts and the Aotearoa-based teachers, students and practitioners can be identified. Specifically, professional drivers to the inclusion of sustainability in the teaching and practice of design in New Zealand are not necessarily values-based. Instead, opportunities are sought that include finding niches or keeping ahead
of market trends as opposed to including sustainability because no one else is or because designers need to be more accountable of their actions.

In conclusion the majority of drivers can be attributed to a necessity, which reflects some values-based conceptions of sustainability identified in Chapter two: Sustainable Education. However, a significant finding is that drivers can be due to the seeking of opportunities that are not related to values, principles or ethics, such as finding niches or keeping ahead of market trends or because sustainability is intellectually stimulating.

**Summary and Conclusions**

The previous chapters indicated that sustainability is included in the teaching and practice of design in a variety of ways, mostly due to the different understandings associated with the meaning of design and also the meaning of sustainability. If the designer indicated a more global understanding of both, then it was more likely that they would include sustainability throughout the design course, either as a specialised course or integrally throughout a general design course. Alternatively, when a more limited understanding of both design and therefore sustainability was indicated, the latter would be included in the former as a separate or add-on subject. In order to understand the outside influences or reasoning behind these types of inclusion, the drivers were analysed.

Significant differences between the underlying notions of necessity and opportunity are evident. The findings indicate that patterns between personal drivers, including moral obligations, personal values, lifestyle influences and general interest in sustainability, are similar for the sample groups of experts and teachers. The findings also indicate vast differences between the experts’ professional drivers and those of the remaining three groups. Thus, it is concluded that the experts are driven to include sustainability in the teaching and practice of design for a number of reasons, one of which is their global, interrelated understanding of the complexity of sustainability (Buchanan, 1992; Conklin, 2006; Neumeier, 2008; Palmer et al., 2007; Wahl & Baxter, 2008), and another is the appreciation that design thinking is within the context of sustainability, where everything is connected (Dewberry, 2009; Dewberry & Monteiro De Barros, 2009; Fletcher & Dewberry, 2002).

This chapter has focused on drivers to the inclusion of sustainability in the education and profession of design from the four sample groups of designers. Accordingly, the following chapter concerns emergent obstacles.
CHAPTER SEVEN

RESULTS: VARIATIONS IN BARRIERS TO THE INCLUSION OF SUSTAINABILITY IN THE TEACHING AND PRACTICE OF DESIGN

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Introduction

Thus far in this thesis, the interrelationship between design and sustainability has been analysed. Findings show that different levels of understanding of design can lead to narrow or broad understandings of sustainability, which in turn influence how sustainability is included in the teaching and practice of design. The previous chapter concerned the professional and personal drivers behind why sustainability is included in the discipline and profession of design. Analyses of findings indicate similar patterns between the sample groups in personal drivers, but the professional drivers differ significantly. This seventh chapter addresses the fifth research question and considers obstacles that can hinder the inclusion of sustainability in design education and practice. As with all other findings chapters, the categories are derived from the data; analysis is through the constant comparative approach described in Chapter three. Four categories are presented, which are organised into either structural or psychological barriers; these are outlined in Table 7.37.

Table 7.37.  

Four Categories Emerge and are Either Structural or Psychological

<table>
<thead>
<tr>
<th>Structural Barriers include:</th>
<th>Psychological Barriers include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a: …a lack of support</td>
<td>b: …a lack of importance</td>
</tr>
<tr>
<td></td>
<td>c: …a lack of confidence</td>
</tr>
<tr>
<td></td>
<td>d: …a lack of understanding</td>
</tr>
</tbody>
</table>

These categories describe the obstacles experienced by the sample groups of designers; they are explored separately in the next two sections. The first section focuses on structural barriers such as those that exceed a participant’s influence. The second section focuses on psychological barriers such as those that relate directly to personal decision-making. Each section describes the overall meanings of the respective categories, followed by in-depth explanations of the contributory elements. Exemplar statements from the participants are used to illustrate the categories and interrelated elements. A comparison of findings is discussed at the end of the chapter, and a diagrammatical graph is used to show the proportions of experts, teachers, students and practitioners who indicate each barrier. The focus is the differences in specific obstacles between the international sample group of experts compared to Aotearoa’s design teachers, students and practitioners.

Structural Barriers to the Inclusion of Sustainability in the  
Teaching and Practice of Design

The aim of this section is to explore the structural barriers associated with the inclusion of sustainability in the teaching and practice of design. Are there patterns or specific reasons that differentiate the four sample groups of designers, specifically in terms of their institution or business? The results provide a foundation for comparison with the
findings from the next section and from the previous chapter. This section focuses on one distinct category and its five interrelated elements, which are described below.

**a: Lack of Support as an Obstacle to Inclusion**

A lack of support for issues surrounding the inclusion of sustainability into the teaching and practice of design are common. Polly argues that it is the government’s responsibility to “maybe make sure there are processes for recycled [electronic goods] now and involve [our company] in that.” She explains how there are not many other companies manufacturing similar products in the country, so she concludes “that’s probably going to be hard.” Therefore, elements that create this category include (i) systems are not in place outside the institution/company, along with (ii) there is no incentivisation, (iii) sustainability is not necessarily a primary driver within the institution/company, (iv) we do not have much influence, and (v) we have to force things to change.

**a (i) Systems are not in place.**

A lack of systems being in place outside of the institution or business in relation to sustainability can be distinguished as a lack of support. For example, “I sort of hit this realisation that New Zealand’s just not very green at all and that systems aren’t in place to support, like I said before, product take-back, [and] material sourcing strategies” (Trevor). Moreover, “education from the other side, the client’s side generally isn’t there so we’re continually having to educate people” (Toby). Toby and Trevor argue that outside of the institution there is a lack of education and systems in place to deal with sustainability, which can impede its inclusion in design. Trent supports this assertion by reporting:

> I think in a way New Zealand lags behind [the rest of the world] a little bit just in percent of information and information gleaning sometimes and there’s, I sometimes say to my students, ‘to the rest of the world, New Zealand has a really green image’, yeah, but the reality is when you live here, it’s actually not, it’s changing and things like recycling initiatives [are only just starting].

Trent suggests that the nation’s global image causes apathy in his home country because some New Zealanders think that this country is clean and green, and he argues it is not. Tait explains “the problem with a lot of these systems is they are not locally specific,” indicating that a reliance on external systems can be problematic. Likewise, within practice, Paddy argues “there’s a lot of risk involved and they don’t have backup service and you’re unsure as to how well it’s going to work and a lot of the systems aren’t designed to work in with other systems,” thus indicating that systems are not yet in place to support sustainable initiatives.

For some practitioners, a lack of systems is indicated through an absence of guidance on material choices. For example, “I was thinking about what materials I should use and it was quite hard to find one comprehensive guide for that kind of thing” (Paolo) and “nobody
is really pioneering. There is not like a materials bank, necessarily, that we go to” (Peggy). Percy indicates “the sad thing that I have always found is that we choose what are considered good plastics, not the perfect plastics but then you come to mono-recycling but we don’t do that in New Zealand” and Pauline insists “people like the clean, chrome look but the process itself is hideously bad but until someone comes up with something to replace that, then it will always be part of the realm.” Also, “[m]y biggest concern, I think is because we use dodgy factories in China that have got little respect for the environment, really and, you know, we use them” (Pete). Pedro explains:

...you’re always trying to make manufacturing within your control, but if it’s in a different country, you don’t always have control over where that materials, where they come from. So in China, you can have a spec [specification] on something but you have to be really careful that they get their materials from the right place. You know, they could lie to you. I guess it’s something that we have to be careful of.

One of Pedro and Pete’s concerns is manufacturing overseas and the lack of external support in ensuring where, what and from whom they purchase have “respect for the environment” or materials come “from the right place.” These examples indicate the complexity of supply chains and external systems and the impact this has on including sustainability into a business or institution, thus confirming that systems are not in place.

a (ii) There is no active support.

A third concern within the element of a lack of support is that sustainability is not necessarily a primary driver within an institution or business. For instance, Tane asserts “there is some understanding that [sustainability is] just intrinsic to any paper but there isn’t an expectation or a more active support either to do it.” Similarly, Taz indicates how one lecture on sustainability only “puts the issues out there in front of people but it doesn’t show them an ongoing way;” he continues “it needs to be valued” by staff and students. Taz argues that if sustainability is not “valued” or supported, then incorporating sustainability becomes challenging. Terry reveals “we don’t have a strong leadership within the school” in this particular field, and Talbot asserts “I mean if you want to be a sustainable company, make sustainable products, you know, then it has to come from the top… that’s always what does it, motivated individuals.” Tait confides “I don’t think we have a champion for sustainability here.” He continues to indicate that in order for sustainability to be addressed someone who is “absolutely passionate about it” is required. Similarly, Thomas reasons “if the management takes a strategic position on sustainability and gets somebody that will champion it, at the board level, that makes a difference.” In brief, these examples from the teachers indicate a lack of internal support. Notably, Tane and Taz indicate more active support is necessary; Terry Talbot and Thomas want strong managerial leadership, as does Tait, who recommends they need a “champion for sustainability.”

For practitioners such as Polly, there is a lack of active support. She claims “I don’t really have a choice” in terms of her participation in making sustainable decisions. Paddy
suggests “there’s people within [the company] that would love to see [sustainability] happen but you’ve got to have the foundations firm before you can start painting the walls.” Peggy argues “[i]t is hard because there is a hierarchy, people could have that mind set but it all has to come from the top.” Percy asserts management “are just not fully implementing it.” He argues how “barriers are more ineffective management strategy over the whole company.” In this way, Percy implies that the lack of internal support comes from the top and is not a primary driver within the company; thus, there is no active support.

a (iii) There is no incentivisation.

Closely related to the previous element is how for some individuals a carrot is better than a stick to help encourage designers to include sustainability in the discipline of design. However, the hypothetical carrot is missing for some, for instance, Pierre argues the lack of encouragement at his company for the employees means they are “not accountable,” adding “and there’s no incentivisation either.” He explains:

It’s not a structural issue. I’ve challenged management several times, ‘where are the performance [indicators]? Where’s the system whereby I can effect change by incentivising what I want to happen? So as a manager, I have a set of tasks and I want the whole company, senior managers to do this and I want them to basically be incentivised in their pay packet, effectively. That’s what normally drives people. It’s about promotion. It’s about pay. That’s one of the key factors that drives people and how can I basically get in there and, you know, motivate them that this is as important as meeting our targets and there’s no, there’s no method for doing that.

Thus, Pierre opines that incentivisation and motivation are important in encouraging colleagues to be more accountable regarding sustainability in their practice of design. Similarly, Peggy reports “as a whole everyone kind of goes about their own business, their own work, there is no initiatives, you do it for yourself.” A couple of students also indicate that there is a lack of incentivisation, such as Sabina:

...I mean we have a huge amount, I think, of waste products, like in our designs and things like that. Like, what happens to them after? You just need to walk around and see all the projects that have been done and graded and all that and they just, like even in our studio, all our last assignments are just lying around and things.

Sabina indicates that students are encouraged to make and waste for their assignments. Salvador confirms the amount of waste and lack of support by stating:

...probably, so far this year, the courses and projects that we’re doing have been quite wasteful in terms of the material, stuff that we use, the amount of plastics that get thrown out and all that kind of crap is unbelievable.

Salvador suggests that student designers generate a large amount of waste due to required projects. Comparable to some practitioners, some of the sample group of students imply a lack of support is evident to incentivise other people to be involved with sustainability.
a (iv) We do not have much influence.

In this case, a lack of support is indicated through companies not being able to influence the supply chain due to their size. For instance, Pauline reasons “our size also means that we don’t have as much influence on some of the suppliers that we’d like to have.” Percy asserts:

...for us with our clients, they are small clients and not having the time and the money to spend developing that knowledge, it is quite difficult.... You know we are working with people, Americans, who have very big ideas and they are hard to change.

Pauline and Percy both indicate that making changes is challenging due to the size of the business and its influence on clients. Also, Percy alleges those who have their own agendas are problematic. On the other hand, Paddy argues:

You have to have the room. You can’t just drop what we’re doing, and it requires extra resource and so what has to happen is, it has to be a slow shift. You know, if you try and do it as fast as possible, but we’ve got no people... We’ve got all the technology, all the knowledge to be able to do [sustainable products] but what we don’t have is the resource to work on it.

In his example, Paddy implies the complexity of making sustainable changes is about the physical location and number of people assigned to the task. These examples create the element that indicates they do not have as much influence as they would like.

a (v) We have to really force change.

Within a lack of support is the concept that sustainable changes are hard to achieve. For example, “I think it’ll be a pretty big shift” (Paige) and “there’s very, very, it’s a very, very small amount of appetite in [this company] for making structural change” (Pierre). Pierre continues, “you have to really force things to happen around here,” explaining:

I just find that, basically, it’s tricky to effect a change. Some people want to change but there’s a huge, like a, it’s like there’s two halves of the company. There’s the head, which knows where it wants to go and basically...trying to move the feet and the body.

Here, Pierre suggests that making structural changes within a business is a challenge, mainly because of the gap between where the businesses plan to go and where they actually are. Eric agrees with the difficulties within business, asserting “[w]hat is actually harder is to get into industry and work for these monsters and make change from within.” Moreover, Tane indicates that “[w]e are really far away from getting anywhere close to [being sustainable] and I’m actually really happy that the oil is peaking, it is probably one of the best things that can happen to drive society towards sustainability.” In this way, Tane, along with the other examples, implies that outside influences will force a sustainable change within societies.
Summary of Lack of Support as an Obstacle to Inclusion

These five elements described above create the category: a: *Lack of support as an obstacle to inclusion*. The category focuses on structural barriers that exceed the participant’s influence and can be internal or external to the institution or business. These include how systems are not yet in place to make being sustainable easy, a lack of active support, such as a sustainability champion, and a lack of incentives. Moreover, there is the opinion that some businesses lack the ability to influence supply chains because of their small size, thus meaning change has to be forced. In contrast to these barriers are psychological ones that are directly related to the participant. Accordingly, these obstacles are explored in the next section.

Psychological Barriers to the Inclusion of Sustainability in the Teaching and Practice of Design

In the previous section, the focus centred on structural obstacles that potentially inhibits the inclusion of sustainability in the teaching and practice of design. Contrastingly, the obstacles explored in this section are psychological. Three distinct categories are created from the data, which are detailed in Table 7.38.

Table 7.38.

*Five Elements (each) Create Three Categories of Psychological Barriers*

<table>
<thead>
<tr>
<th>b: Lack of importance</th>
<th>c: Lack of confidence</th>
<th>d: Lack of understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) Everyone is busy</td>
<td>(i) Not conceptualised meaning yet</td>
<td>(i) There is a difference between looks greens and is green</td>
</tr>
<tr>
<td>(ii) People are not interested</td>
<td>(ii) I am just one person</td>
<td>(ii) There is no money in sustainability</td>
</tr>
<tr>
<td>(iii) It is not at the top of list</td>
<td>(iii) Do not feel confident enough</td>
<td>(iii) Sustainability means too many things</td>
</tr>
<tr>
<td>(iv) There is many a slip ‘twixt cup ’n lip</td>
<td>(iv) I am not an expert</td>
<td>(iv) Sustainability is a guilt trip</td>
</tr>
<tr>
<td>(v) It does not rule my life</td>
<td>(v) I do not want to preach</td>
<td>(v) People’s freedom is constrained</td>
</tr>
</tbody>
</table>

Each category and its interrelated elements are described below. The first category focuses on a lack of importance, the second on a lack of confidence, and the third on a lack of understanding.

**b: Lack of Importance as an Obstacle to Inclusion**

In this case, sustainability does not warrant enough importance to become a priority for inclusion in the discipline or profession of design. For instance, “there arguably isn’t enough concern around it and whether or not it’s taken seriously” (Toby). This category is created from five interrelated elements that explore concepts of: (i) everyone is busy, (ii)
people are not interested, (iii) it is not at the top of list, (iv) there is many a slip 'twixt cup 'n lip, and (v) it does not rule my life.

b (i) Everyone is busy.

A lack of importance is demonstrated as sustainability is pushed down the priority list due to time constraints. For example, Peggy asserts that it is the environmental manager’s role to be involved with sustainability, arguing “that is their role and I have got my role and I am busy and everyone is busy.” On the other hand, Trevor asserts “[p]eople want to do the right thing but they’re leading busy lives” and Todd indicates “I think, for us, it’s probably the time, finding the time.” Polly argues how employees want be involved in sustainability, “but at the moment, the economy is so bad and I think [our company is] trying to just survive at the moment. So I think it’s not high on their agenda.” In a similar way, Trent reports how sustainability is:

...taken at different levels by different people, [and] amounts of serious[ness]... It’s almost like you’ve got to wait until [a suburb of the city] is completely submerged in water until you go, actually, maybe they were right ten years ago, or whatever and I think in a really cynical way, it’s too late now, but I don’t know. That’s not a good way to live your life. But I think [my university is] sort of symptomatic of that.

In his example, Trent suggests that, because sustainability is understood in different ways and treated with different levels of respect, people will not act until it is “too late,” thus indicating how “people within the system do not entirely value it yet” (Taz). These examples create the element that everyone is busy.

b (ii) People are not interested.

The opinion that sustainability is not that important for some of the participants can be seen in statements such as “I probably haven’t thought about [sustainable design] much” (Paolo). Percy argues how some of his colleagues are not interested in sustainability, reporting “I don’t think they were onto it.” Peggy agrees “there are definitely people who aren’t interested in it at all.” Pierre indicates “[t]here’s a few people who are less, who maybe are interested but they just have reasons why they don’t prioritise it,” while Trent reasons “I think some people still regard all these [sustainable] things as a fallacy and a way to market [the products].” Samson suggests “if more people are aware of it, then more people will be requesting universities to be teaching about it.” Examples from practitioners suggest there is some apathy within business, while Trent asserts how misinterpretation of sustainability means people do not think it is important. These examples indicate that some people are not interested in sustainability; therefore, it will lack importance for them.

b (iii) It is not at the top of list in terms of informing decisions.

Other participants report how sustainability is not an integral part of the decision-making process. In particular, Preston argues “it’s not at the top of my list in terms of
informing my decisions at the moment” and Peggy indicates “there is the whole society thing, I suppose [being unsustainable] is the way the world is... in some ways you have to accept it.” Paige insists:

...most of the focus for me is on usability and also how the products fit within the [company]. Sustainability doesn’t really come into it... I don’t think [sustainability is] an integral part of the, I don’t think it’s in the back of everybody’s minds the whole time that they’re working through a project. I know it’s not in mine.

Sustainability is not necessarily an important aspect of Paige’s decision-making process. Similarly, Pauline asserts:

...it’s not as if you’re coming up against any ignorant people but you have to nail it down as to whether it’s actually the right decision to make because you have so many other variables that you’ve got to take into account.

Like Paige, Pauline indicates that there are many other variables that overshadow sustainability, suggesting it lacks importance. Some participants from the sample group of students indicate that there are so many other aspects to think about, sustainability takes a low priority. For instance, Sidney included sustainability in her project, but did so subconsciously, reporting:

I probably should have thought about it more, I think because we weren’t being marked in it... because we hadn’t really been told to think about [sustainability], that is going to make me sound stupid, that I have to be told something to do it. Do you know what I mean? There is so much other shit to worry about (Sidney).

In her example, Sidney indicates she could have done more in this field if she had been told to do so, but because she had not been given direct instructions, she did not really think about it. Thus, she exemplifies the element that sustainability is not an integral part of the decision-making process.

b (iv) There is many a slip ‘twixt cup ‘n lip.

A further example of the barrier A lack of importance is how easy it is to make mistakes; for example, even those with good intentions to include sustainability omit it when under-pressure. Notably, Thomas asserts:

...sustainability is an issue for them and they like to think that they’re, you know, we all like to think that we’re good, societal citizens, that we, you know, that we do the right thing but they’ve all mounted their stuff on foam core. They think nothing of wasting and consuming materials like they’re going out of fashion. They’ll use lacquer spray paint because it dries faster and that’s more important to them when they’re under pressure than the fact that it’s pumping, you know, all sorts of things into the atmosphere. So there’s a many a slip ‘twixt cup ‘n lip, as they say.

The expression “there is many a slip ‘twixt cup ‘n lip” implies that even when the result of an event seems assured things can still go wrong. For example, there is a slip between the cup of sustainability and the lip of reality, which is that some people are not ready to understand or accept sustainability. Thomas, in his example above, complains how
students instantly forget what they know “when they’re under pressure” from deadlines, which reflects aspects of the previous element (in particular, Sidney). Taz reports “students as a group, not individually, as a group treat [recycling bins] as rubbish bins and not recycling bins and we end up with stuff that can’t be recycled in them, [such as] food and [some types of] plastic” indicating that “it only takes one person in a group to make that system fail.” Similarly, Pierre argues:

I actually find, even in the design team, there are some people who are really quite motivated, still when the push comes to shove, they just sort of just need to get the job done quickly and so some of these things are not considered as well as they should have been considered.

In his example, Pierre asserts how the stress of job completion pushes sustainability away and some important issues are missed. Patrick also details:

I think some of the business decisions that the Board have to make, if you talk to them about sustainability, I mean they’d be kind of interested but if you caught them at the wrong time, they’d be like, no, sorry, I’ve got more important things... to do.

Patrick explains how his seniors are interested in sustainability, but under time pressure it becomes lower on the list of priorities. These examples suggest that when under pressure sustainability become less important, thus creating the element: There is a many a slip ‘twixt cup and lip.

b (v) It does not rule my life.

Some participants indicate that in order to include sustainability, their lives have to be governed by it; therefore, a lack of importance determines prioritisation of other decisions by participants. For example, Pete reports “I wouldn’t say I’m an eco-warrior, no. I just like to try and do my bit but it doesn’t rule my life by any stretch.” Parker argues “I wouldn’t consider myself to be sort of thinking about the environment every day, or thinking that I need to be doing a better job of supporting the environment.” Similarly, Tait states “I think it is important but I wouldn’t say I am an incredible advocate of it;” he reiterates “I will be honest and say I don’t make it my number one priority.” Pauline asserts:

...you make your own decision as to what you want to achieve and sort of how much an effect people are taking on is a very passionate thing. I haven’t done that [taken on board sustainability] but that’s only because my life is such, I can’t afford to put that much effort into that, you know. I’d rather put it into something else and that’s just a choice.

In her example, Pauline suggests she associates making sustainable decisions with being passionate about sustainability, in the same way as Pete is not an “eco-warrior” and Tait does not make it his “number one priority.” These examples create the element that sustainability does not rule peoples’ lives. Pauline also suggests that she is too busy to include sustainability, which reflects aspects of the previous element.
Summary of Lack of Importance as an Obstacle to Inclusion

These elements create the category of a lack of importance as being an obstacle to the inclusion of sustainability in the discipline and profession of design. The category is characterised by five interrelated elements, which include a lack of interest, the ease of which mistakes can be made and being a low priority in terms of people being engrossed in other areas. As a result, there are a variety of barriers included in a lack of importance. The following category concerns a lack of confidence.

c: Lack of Confidence as an Obstacle to Inclusion

Another obstacle to the inclusion of sustainability is a lack of confidence. This aspect can be connected to the previous three categories, yet also stands as an individual category. For example, Sheila explains her lack of confidence in comprehending and expressing sustainability by reporting “[i]t’s still a bit sort of wishy-washy. I still feel like I need a bit more information, a bit more depth to fully understand it or just articulate it.” In this way, a lack of confidence can be presented as (i) we have not conceptualised a collective view of what sustainability is yet, (ii) I am just one little person, (iii) we/they are not ready yet, (iv) I am not an expert, and (v) I do not want to preach.

c (i) We have not conceptualised a collective view of what sustainability is yet.

In this instance, a lack of common understanding is the focus. Tait reasons “as a collective... we haven’t conceptualised a collective view of what sustainability is ourselves.” Ted communicates how:

...the different papers that students take, [are] not concurrent, they might be doing three papers in a trimester, those three papers although they are supposed to relate when they were first designed, they were supposed to relate to each other somehow. They don’t really relate that much anymore... So perhaps that one thing that could be useful would be more collegiality between the papers.

Ted indicates that the issue for him is the lack of commonality between the different design papers, implying the lack of a collective view about sustainability. Eddie reports:

All we have to talk about this are our words but words mean different things to different people. So in fact, trying to respond now [to the question], I find myself thinking, well ‘gee, will this word mean the same to Nicola as it does to me,’ and that makes it really, really challenging. So we are actually never quite sure that we are communicating with each other. I think this is true of any two people who are trying to talk about anything; we are never quite sure. When you are talking about something like sustainability, which itself hasn’t really been defined and which is a loaded term, it makes it especially difficult.

In view of this, Eddie is implying how different people’s definitions of sustainability can be; he also implies that sustainability is a particularly “loaded” term. Similarly, Ted suggests “I think before I can answer a question like what does [sustainability] mean [to me],
you need to consider a lot of different things.” So Ted, like Eddie, indicates a lack of collective view regarding the word. Taylor implies a lack of confidence in his conception of sustainability, which he argues is markedly different to others peoples’ understandings, stating “I’d probably have a pretty negative perception of sustainability at the moment in the way that it’s presented to people.” He continues:

As an example, this building we’re in is about to become carbon neutral which, all it means is we’re paying more for our power because we’re going through a different power company that produce the power through wind turbines and so that’s carbon neutrality. We’re not changing our actions. We’re not becoming more efficient as a building really. We’re just purchasing it from someone else and it’s just been such a political move. Yeah, I don’t know. It doesn’t seem to have a lot of integrity to me, [it’s a] bandwagon [that] a few too many people are jumping on a few too quickly, because I think that... sustainability will have real problem keeping integrity. Having said that, it might also get a lot more power that way.

This example from Taylor shows the differences between understandings of sustainability, specifically indicating how “sustainability will have real problem keeping integrity.” On the whole, these examples indicate a common perception that the lack of a collective understanding about sustainability can result in a barrier to inclusion.

**c (ii) I am just one little person.**

A second meaning to a lack of confidence is the feeling that one person cannot make a big difference; notably “I guess it is a big company and I’m just one little person” (Paige) and “personally, I know we can’t change the world by yourself” (Pete). Paige explains “I guess part of it is that, as a grad [graduate], a lot of the stuff that I’m working on, it’s not really my place to jump up and go, hey, we’ve got to do this.” Moreover, Percy compares his company to “Interface Flooring,” reasoning that they “have had a team of, what was it?  Sixteen people?” in their research and development department. He suggests “the amount of output of sixteen people and probably the budget would be, well it is massive, compared to what one person can achieve.” Similarly, Percy maintains how being a small company, with low numbers of people and minimal budgets, restricts the inclusion of sustainability. Also, Theodore asserts “[i]t’s quite frightening and obviously we can’t really do any changes as an individual if the industry doesn’t change its habit.” Therefore, evident within the data is a lack of confidence due to being a small cog in a big wheel.

**c (iii) We/they are not ready yet**

Within this category, a lack of confidence is a concern held by teachers that students are not primed to absorb information about sustainability, thus making them not ready. Taz and Trevor suggest:

But at the moment, I am not sure that we are either delivering [sustainability] the best way or making it explicit enough or the ground is, the students are not fertile enough to pick it up, I am not quite sure what it is. It is probably all of those things (Taz).
When you first raise the design for the environment, green design, eco-design there’s a feeling of hopelessness in some young students and so some actually can’t handle it and they don’t want to know and I think it’s just they’re not ready (Trevor).

In their examples, Taz and Trevor reason why it is challenging for the students to understand sustainability; both infer the students are not ready for this type of information. Contrastingly, Todd opines “we probably don’t feel that confident enough to pass [sustainability] on to the students.” So Todd differs to Taz and Trevor, through his own feelings of doubt about teaching sustainability, as opposed to the students not being ready.

Paddy asserts “the trouble is to design the product and its systems that go into it is very difficult and you’re often buying off a brand you’ve never heard of before,” thus indicating uncertainty with supply chain decisions. On the other hand, Paige admits “I am concerned about [sustainability], but I don’t really know what I can do about it.” Preston suggests “[a] lot of people, I think, are still putting it in the too hard basket. They really want to go there but they’re not quite sure how.” When asked what sustainable design is Pete admits “I don’t know really. I’ve struggled to get my head around what the whole thing actually means.” These examples, from the practitioners and the teachers indicate that feelings of not yet being primed, or organised to include sustainability can become a barrier to its inclusion in design.

c (iv) I am not an expert.

Evident for some participants is a clear distinction between experts and non-experts within the field of sustainability. The distinction, however, reflects aspects of a lack of support but results in a lack of confidence. For example, Trent explains his experience at a conference, where he has previously met design and sustainability experts, reporting:

...hearing [expert] people speak like [lists three researchers/designers involved in sustainability] and other people like that and just listen to them, thinking wow, you’re quite self-righteous and you’re very, it’s quite easy for you to play the blame game.

Trent argues that the experts he heard speaking were not supportive, instead reprimanded conference attendees, who are individuals attending sustainability workshops and conferences specifically because they are keen to learn more about sustainability and design. In a similar way, Talbot claims that at a different conference with “prominent industrial designers from throughout the United States,” the “keynote speaker” was very insulting and “told us we were all stupid.” So for both Talbot and Trent some experts in the field of sustainability were not supportive of non-experts’ intentions.

For other participants, they reiterate a lack of confidence in their own abilities. For instance, Tait indicates “I am no expert on [sustainability] so it is very difficult for me” and Pedro clarifies “I’m not an expert on it by any means.” Todd explains:
...it’s a matter of having time to update our knowledge or bring it up to the next level in sustainability because if it’s not your research area itself, it’s hard to find the time to read into the area and I think that that is the point that we’re always struggling.

In his example, Todd indicates that if sustainability is not part of the research area of himself or his colleagues, then including sustainability means having to “update[e] our knowledge.” Thus, where knowledge is not updated, researchers/teachers will “struggle.” Trent argues:

I don’t think [we have] the expertise either. Like lots of us are either good designers and good educators, and sustainability, or sustainable issues, are a constantly evolving thing. You don’t have anyone who’s, like an expert on stuff that’s happening.

Trent indicates a lack of expertise in sustainability within his department, and Preston asserts “I think we could be better educated in terms of our understanding of what’s possible.” Patrick suggests “I would think product sustainability would be something that we need to kind of explore a bit more, a lot more, you know,” and Percy reports how the company he works for “is on a very small knowledge bank” and how it “is split into lots of little areas and everyone looks after their own little area.” Peggy also claims “I don’t think we are educated enough.” Terry argues:

Another barrier is the level of staff, the kind of understanding. We have enthusiasm, a degree of enthusiasm, which is good but I think the ceiling of ability or understanding means that we can only take it so far or I can only take it collectively so far.

Terry suggests how a shared understanding of sustainability is important and is currently missing within his departments. Similarly, Eve asserts:

I think that no one else in our department is doing it. I don’t think my department is against it, I think they are afraid of it. I think that they feel that they have to be an expert in it in order to teach it.

Eve indicates that she doubts her department has an understanding of sustainability, specifically because her colleagues feel they need to be an expert. Both Eve and Elizabeth admit “I am not an expert,” but this does not obstruct their inclusion of sustainability. These examples create the element of ‘I am not an expert’.

c (v) I do not want to preach.

There is the notion that advocacy of sustainability or associated opinions can be interpreted as indoctrination. One student in particular opines “[p]erhaps a bit too much preaching is happening” (Simon). This perception is also found within the sample group of teachers, as Tane reports:

I don’t quite give lectures on sustainability because I found that many people, when they find that I’m preaching sustainability, they have a bit of a, you know, they are a bit, they create a bit of a distance, if that’s not their interest, to start with.
In his example, Tane explains that he does not specifically lecture or inform the students about sustainability, indicating that he does not want to be seen to be preaching. Terry questions:

...sustainable design in effect is starting the conversation and pursuing it as vigorously as possible whilst staying in business. So there’s a kind of a knife-edge there. You know, how close to that boundary can you get before you piss everyone off?

Here, Terry indicates the balance between pushing sustainability and disrupting progress by angering people. Trevor argues that some students:

...they don’t want to know [about environmental issues] and I think it’s just they’re not ready and if you ram it down their throats, they’ll actually try and put shutters up because they’re actually feeling genuine angst about the situation.

Trevor is concerned that forcing students to understand and address issues of sustainability can build barriers, especially if the students experience actual apprehension or anxiety. These examples imply that teachers are trying to find a balance between pushing too hard and pushing enough to get a sustainable message across.

**Summary of Lack of Confidence as an Obstacle to Inclusion**

In this category, a lack of confidence as an obstacle to the inclusion of sustainability is characterised through five elements. These include the participants’ feelings of not conceptualising sustainability with colleagues, and of being just one person trying to make a difference. Not wanting to preach is identified, alongside not being ready to include sustainability in teaching, specifically because of not being an expert in the field, which indicates a lack of confidence. The last category to be explored is a lack of understanding.

**d: Lack of Understanding of Sustainability as an Obstacle to Inclusion**

This category relates to the confusion caused by the amount of, and contrasts in, meanings of sustainability. For example, “I think that’s part of the problem too, is that there is conflicting results and evidence all over the place” (Toby). Therefore, this category is described as: (i) there is a difference between looks greens and is green, (ii) there is no money in sustainability, (iii) sustainability means too many things, (iv) sustainability is a guilt trip, and (v) people’s freedom is constrained. These five elements begin to describe how, for some participants, a lack of understanding of sustainability becomes an obstacle.

**d (i) There is a difference between is green and looks green.**

Closely related to the previous element is how sustainable design can be misrepresented, thus contributing to the phenomenon of “greenwash” (Eve; Emily; Percy;
Tom). This can be described as a company having superficial sustainability and doing the bare minimum. Eugene and Tom explain:

In some ways it takes running the numbers to figure out which is more ‘green’ but in practice none of us can do that. We can’t do that for all of the decisions that we make. So there is a difference between is green and looks green (Eugene).

...one of the pet hates is that kind of greenwash that’s happening at the moment where everyone’s claiming to be sustainable but if you actually analyse it, there are a lot of things you can be picky about (Tom).

Tom and Eugene report how some businesses “claim” to be sustainable or “green,” but being sure which is which can be challenging. Thomas argues “I think, unfortunately, some of it’s been picked up as a device to sell things,” and Taylor (as indicated in the previous category) asserts “sustainability will have real problem keeping integrity” because of “[t]he bandwagon, a few too many people are jumping on a few too quickly.” Theodore claims “the word is mentioned probably at the very top... even [in] a normal meeting, you’ll probably, within an hour, it will be mentioned about 15 to 20 times in any discussion.” He reasons:

There is a big risk of [sustainability losing its meaning]. That’s my concern because you will make people sick of hearing it all the time and it becomes, yeah, it would not have any meaning when you’re trying to use it, with people on television using it as a joke or people using it just to get something, [like a] hidden agenda, like politicians do and so on.

Theodore indicates a concern that sustainability will lose its meaning due to being bandied around freely and with a lack of significance. Similarly, Trent disputes “how carbon credits work and how it relates to companies and how it’s just a lot of sort of backhanders and stuff. You can see why people would be sort of frustrated with it.” Salvador questions “I don’t understand how we’re a carbon neutral school at the moment,” and Simon argues:

I think the other thing from a New Zealander’s point of view and its place in the world is that we have this kind of image of being clean and green in New Zealand which I think is actually a little bit of a myth because while we’re a relatively clean and green country, our practices are not necessarily very clean and green compared to, say, some countries in Europe, for example.

Trent, like Theodore, Taylor and Thomas, suggests that the misuse of the term sustainability and design creates this element called greenwash.

d (ii) There is no money in sustainability.

Within this category is the conception that sustainable initiatives are an expensive alternative to regular design initiatives, which reinforces the opinion that businesses cannot make a profit. For example, Talbot reports “[t]here’s no money in it,” Pete concurs “it’s not cheap to do all this... at the end of the day, we’re here to make money.” Also Pierre indicates “there’s quite a lot of difficult reasons, lack of time, money, you know, reasons, I call them excuses or reasons why people don’t want to run with this as fast as I know they
could.” Simon argues “it’s not necessarily economical and so forth, it’s not necessarily of that much benefit to be green, you know, in the short term,” and Terry questions “how can you keep clients and markets on board and be successful whilst pursuing this [sustainable] agenda?” Percy explains:

We are in a capitalist world and unless we change that world or even if you do change it you still have to profit in some way, otherwise you are going bankrupt... it is extremely difficult in New Zealand. We were at [location] and we were doing design between ten and thirty thousand dollars for the design of a product. It is not much money. Yeah, you can only do so much and you can only spend so much of your time developing the background.

For Percy, ensuring the company can make a profit is essential and he implies living in this island nation makes it challenging to do so. Other participants indicate the recent recession as playing a role in how expensive sustainability can be; for instance, Paddy reports “I guess times are tough and so we’re sort of just battening down the hatches and trying to ride the storm [in terms of recession] at the moment, to a certain degree.” Polly asserts that “people want to” be involved with sustainability, “but at the moment, the economy is so bad and I think [the company] are trying to just survive at the moment.” Alternatively, Patrick suggests “[i]f a company could see that, how they can actually, how they’re going to make more money by being sustainable, you’re home and hosed.” These examples indicate how there is the consensus that there is no money or profit to be made from sustainable initiatives.

d (iii) Sustainability is a guilt trip.

Following on from the previous element, sustainability is not only constraining, but can also instigate feelings of guilt through the following examples. Eddie reports:

A day doesn’t go past when I don’t realize that, gee, something that I did... I am feeling guilty, because I could have done it a different way and it could have been more sustainable. Part of this is because we are living in a society that is a throwaway society and it is completely unsustainable. And this makes it very difficult, but on the other hand I realize that you can really drive yourself crazy trying to be sustainable in every possible way. And be very frustrated because you will never get there.

For Eddie, he suggests how frustrating it is not being able to “be sustainable in every possible way” further indicating how he incurs “great difficulty and great conflict” on a regular basis. Similarly, Taylor argues:

It seems to me as if we’ve finally escaped the confines of religion where once a week we would be told how bad we were and how evil mankind was and we could repent and now, that’s started to collapse in the Western World anyway to some extent, it seems other evangelical people have come along and it’s ‘sustainability’. Now, often, it’s not, perhaps with the goal of truly being sustainable just looking at it and making it a guilt trip for everybody else.
In his example, Taylor indicates frustration with “evangelical people” pushing sustainability and “making it a guilt trip for everybody else.” Samson further exemplifies these views, by reporting:

I don’t buy things, like The $2 Shop, I’m morally against it because everything there is made to break, basically and it’s just such a waste and I try and convince everybody how wrong it is.

Similar to Samson’s evangelical actions, when Tane answered how he approaches sustainability in his personal life, he joked “the fact that I had a takeaway coffee yesterday is not a very good example, with you, is it? I wanted to take the lift and you made me take the stairs.” Although Tane’s response is light-hearted, he indicates a societal pressure of not doing enough, which is reiterated by Terence, who understands his actions are “probably not good enough.” So Tane’s light-hearted response summarises the element that sustainability is a guilt trip.

d (iv) Sustainability means too many, and conflicting, things.

For many participants, the word sustainability is over used, which causes frustration and adds to a lack of understanding. For example, Emerson, Toby and Preston argue the word sustainability has become a “buzzword.” Elsie opines “it means too many things” and Evan asserts “[o]ne of the problems of teaching sustainability, [is that] it has so many different names, there is no single meaning and no single view about what sustainability means.” Eddie insists “sustainable is a loaded word. I can get on the Internet and come up with over 300 different definitions of what sustainable means.” Terry reports “I think sustainability is problematic. If you start to inquire into it, it doesn’t make sense,” explaining “the concept of sustainability is a bit flawed, that word, because nothing stays the same.” Emily indicates she has a “love-hate relationship” with the word “because sustainable means we are just barely keeping up, sustaining what – you have to ask.” Also Edmond argues “the word ‘sustainable’ got hijacked by the economists and they thought it was all about economic sustainability and bugger everything else.” Ethan explains “the lack of clarity about language is partly an obstacle to progress, we aren’t all necessarily understanding each other well.” In this way, the word ‘sustainability’ means too many things.

Similarly, the practitioners indicate “it seems to me as you could pick a product, you get three people to write the environmental profile, whatever you’d like to call it, on it and you’ll get three different results” (Phelps), and Paolo argues “there’s nothing that’s really clear with sustainability there at all. Everything all affects everything else.” Percy indicates:

That is the hardest thing, really, is because there is never a right way really, when you are talking about efficient materials and one has a higher energy content than the other but you can do other things with one that you can’t do with the other then that is really debateable when you argue which way is the right way.
Percy, like Paolo, suggests there are no clear definitions of sustainability. Trent asserts “you can’t have sustainable design,” because it “is an oxymoron.” He explains:

...just by [its] definition ‘to make’. As soon as you engage within design, at some point [you make stuff]... the human race is not at a stage where it’s a cyclical, non-polluting animal or entity like nature is. So nature’s production cycle is: ‘whatever happens, happens for a reason’, [everything] is used or utilised by something else. Waste, per se, is not really produced in the natural environment. We don’t do that, we pollute.

Trent suggests that the “human race” creates and mismanages waste and creates pollution, unlike the cyclical nature of the natural environment, where waste does not exist. In this way, he argues that sustainable design is an “oxymoron.” Similarly, Todd reports “I think you can’t completely, 100 percent, reach a sustainable design at the current stage with the current manufacturing process and stuff.” For both Trent and Todd, sustainability and the intention of design are not aligned. These examples indicate that making decisions can be confusing when sustainability has so many, and sometimes conflicting, meanings.

d (v) People’s freedom is constrained.

A further barrier associated with sustainability is that it is constraining and reduces individuals’ self-governance. For instance, “the current discourse about sustainability... is another way that people’s freedom is constrained. It is another set of rules about how we should live our life” (Ted). Elsie reports:

I have a very conflictual relationship with the fashion system, because we are in Italy and we are pushed to change our style every six months. So you have to control your desires, your compulsives to buy new things because of the idea that your wardrobe is limited. So that is something you have to deal with. I am not a person who feels sacrificed because of this.

Elsie explains how the fashion industry is continually pushing new trends and indicates that she does not feel “sacrificed” because she limits her wardrobe, implying that this could be construed as a constraint. Peggy’s concept of sustainable design is “it is kind of weaving a basket and then using that to carry your stuff around. So it is going back to basics.” On the other hand, Ethan suggests it is not the responsibility of the consumer, explaining:

If it is determined that the cost of a can of coca-cola is ex-amount of CO2 emissions in its life-cycle, I could in theory stop buying coca-cola, but why don’t all the decisions about how harmful it is in the environment are not taken by me but by the people who design it, manufacture and distribution systems etc. I think it is a form of lying and devious politics to emphasise so much the question of individual consumer choice and behaviour, because our freedom is terribly constrained by all these other questions.

Ethan suggests sustainable choices should not be about “personal life-style choosing.” He argues “the problem or the challenge is very conveniently framed by politicians and it is a question of individual responsibility.” Ethan continues “if everybody
would individually make decisions to travel less, use low energy light bulbs etc., that would solve the problem.” He also gives reasons why changes will not be seen:

The rhetoric that I use is that 80% of the environmental impact of products and services are determined at the design stage. Very few citizens are involved in the design of the things that they use in their daily lives. Therefore telling people to feel guilty and to make personal behaviour changes. I just think it is the wrong way, the wrong way to think about it.

Ethan opines that politics pressurise society into feeling guilty about decisions and constrains their freedom. He has confidence that this is the wrong approach to sustainability.

**Summary of a Lack of Understanding of Sustainability as an Obstacle to Inclusion**

These five interrelated elements create category d: *lack of understanding of sustainability*. The elements include how greenwash is frustrating for participants who want clarity in sustainability and not confusion, which is also indicated as sustainability means too many or conflicting things. A further barrier can be associated with not being able to make money in this field and that people’s freedom is constrained; other participants describe how the evangelical behaviour of some people causes sustainability to be similar to a guilt trip.

**Barriers can be due to a**

**Lack of Support, Importance, Confidence, and Understanding**

This chapter has focused on a variety of barriers to the inclusion of sustainability in the teaching and practice of design. Similar to categories in previous chapters, these categories (a-d) also complement much existing sustainability-in-design literature. Again, important methodological differences between the literature and the current findings are clarified and discussed below.

I have thoroughly explored the categories and their interrelated elements in the section above. The aim within this section is to explore the variations in these obstacles and consider the implications of the resulting relationships and connections. The categories and elements are summarised in Table 7.39 (next page) in a matrix and appear in the table vertically, the commonalities between the categories are horizontal. Special emphasis is given to the proposed commonalities: *Lack of support, Lack of importance, Lack of confidence and Lack of understanding*. Hence, ten distinct but clearly linked barriers are evident. The bottom, right-hand side of the table (nine boxes) appears in grey, which indicates an underpinning notion of values.
Table 7.39.

*Commonalities in the Different Barriers towards Including Sustainability*

<table>
<thead>
<tr>
<th>Category: Structural Barrier</th>
<th>Psychological Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lack of support</strong></td>
<td></td>
</tr>
<tr>
<td>a: Lack of support</td>
<td>(i) Systems not in place (ii) No active support</td>
</tr>
<tr>
<td>b: Lack of importance</td>
<td>(i) Everyone is busy</td>
</tr>
<tr>
<td>c: Lack of confidence</td>
<td>(i) Not conceptualised collective view (ii) I am just one person</td>
</tr>
<tr>
<td>d: Lack of understanding</td>
<td>(i) Difference between looks greens and is green</td>
</tr>
<tr>
<td><strong>Lack of importance</strong></td>
<td></td>
</tr>
<tr>
<td>(iii) No incentivisation</td>
<td>(ii) People are not interested (iii) It is not at the top of list</td>
</tr>
<tr>
<td><strong>Lack of confidence</strong></td>
<td>(iv) There is many a slip ‘twixt cup ’n lip (iv) I am not an expert (iii) It is a guilt trip</td>
</tr>
<tr>
<td><strong>Lack of understanding</strong></td>
<td>(v) Have to force change (v) It does not rule my life (v) I do not want to preach (iv) It means too many things (v) Freedom is constrained</td>
</tr>
</tbody>
</table>

Described in the chapter so far are categories of a: *Lack of support*, b: *Lack of importance*, c: *Lack of confidence* and d: *Lack of understanding* and each through five interrelated elements. Emerging from this table are similar commonalities that run through each category, thus reducing the twenty elements across the four categories into ten distinct barriers.

A further commonality that underpins the concepts of importance, confidence and understanding is a precept identified in the literature review (*Sustainable Education*): the values and ethics associated with sustainability. It is a widely preconceived notion that sustainability is intertwined with a particular type of ethical persuasion (Fien, 2002; Fien & Tilbury, 2002; Fien & Wilson, 2009; Hopkins & McKeown, 2002; Tilbury & Wortman, 2004). As a result, some of the barriers reflect a moral undertone. The ten barriers are discussed in detail below.

1: **Internal and external systems are not in place to assist with the inclusion of sustainability (support).**

This barrier is grounded in a lack of support and focuses on systems not being in place, either inside or outside the workplace. The first part of the barrier concerns active support, described by participants as a ‘champion for sustainability’, where sustainability is valued within an institution or business. Williams (2008) argues that within some universities there are inadequate financial and general resources allocated for change, and a
general lack of support for innovative change. Moreover, this “lack of economic and human resources to develop actions...means that many of the initiatives rely heavily on volunteers” (Calvo Roy, Benayas, & Gutiérrez Pérez, 2002, p. 98). These issues translate into potentially ineffective management strategies that can fail to address the support and influence necessary to instigate change (Calvo Roy et al., 2002). The second part of the barrier is externalised responsibility, and support that indicates governments should take the lead (Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007). For instance, enforcing or supporting sustainable initiatives, such as product take-back, material sourcing strategies, manufacturing within a businesses’ control, and also restricting unsustainable practices, such as the chroming process. All of these schemes rely on support at a government level, and Sibbel (2009) indicates a lack of accessibility to and reliability of necessary information, specifically for governmental decision makers. Thus creating the barrier: Internal and external systems are not in place to assist with the inclusion of sustainability.

2: There is a reluctance to change current practice (support + importance).

This barrier comes from a combination of a lack of support and a lack of importance. It can be explained as sustainability being separate to individuals’ current approach to teaching and practice, where there are limits to traditional boundaries that tend to reward teachers for working within the confines of their discipline only (Peet et al., 2004; P. M. Williams, 2008). Stepping outside of that boundary causes additional workload and everyone is too busy to address additional tasks. There is a “reluctance to change lifestyle” (Lorenzoni et al., 2007, p. 450). Pierre indicates that if incentives were available, then people would step over the boundaries. However, this contradicts Pink’s (2010) argument that rewards and punishment are only beneficial to improving mechanical or algorithmic tasks, but direct incentives are devastating on heuristic problems such as the complexity associated with sustainability. Instead, Pink asserts the need for “autonomy” (ibid., p. 85), “mastery” (ibid., p. 109), and “purpose” (ibid., p. 131). Otherwise this barrier emerges: There is a reluctance to change current practice.

3: Sustainability is not a top priority (importance).

Grounded in a lack of importance, this barrier includes how people are generally not interested in sustainability, and as such it is not at the top of the list of priorities. A lack of interest can be attributed to apathy towards issues associated with sustainability (Barr, 2003; Lilley, Lofthouse, & Bhamra, 2005). For some institutions, a lack of importance comes from inertia that slows or halts progress (Calvo Roy et al., 2002; Hagan, 2003). A lack of awareness amongst teaching staff of the importance of sustainability is quite common (P. M. Williams, 2008). Accordingly, other activities, actions and decisions are deemed to be more important (Lorenzoni et al., 2007, p. 450). Thus, sustainability becomes low on a list of priorities creating the barrier: Sustainability is not a top priority.
4: There is often a lack of collegiality (confidence + support).

The basis of this barrier comes from a lack of confidence blended with a lack of support and can be described in three different ways. The first aspect is a lack of collegiality between experts and non-experts. Findings indicate how challenging the implementation of sustainable initiatives can be when experts are judgemental about other people’s decisions, particularly if they are deemed ‘non-expert’. In this way, “the smug sanctimoniousness of the converted,” makes sustainability “all the more resistible by those impervious to moral imperatives” (Hagan, 2003, p. 6), thus fuelling scepticism of the whole phenomenon (Idso, 1998; Lorenzoni et al., 2007; Pielke, 2004).

The second aspect is a lack of collegiality between colleagues. Here the barrier reflects a lack of support and confidence through colleagues indicating the lack of a collective view, which can create additional challenges to the inclusion of sustainability, not just in design but also in other disciplines. This is particularly true when staff members feel they have little influence on other people, either up or down the chain.

A third aspect is a lack of collegiality within society. Here, the complex, interrelated relationship between design, society and culture is constantly changing (Fletcher & Goggin, 2001; Hagan, 2003; Stairs, 2005). As a result, those who are attempting to action sustainability can often feel alone in their endeavours, like a “drop in the ocean” (Lorenzoni et al., 2007, p. 450). Therefore, a lack of collegiality between experts and non-experts, between colleagues, and within society can create barriers to the inclusion of sustainability in the teaching and practice of design. Thus, creating this barrier: There is often a lack of collegiality.

5: Mistakes make systems fail; meaning we are not ready to include sustainability (confidence + importance).

This fifth barrier is grounded in a lack of confidence amalgamated with a lack of importance and relates to the notion that it only takes one person in a group to make a system fail. Here, mistakes are deemed as bad news and will cause ultimate failure, which is challenging considering the human ability to make mistakes (Reason, 1990). As such, this fear of failure can affect individual’s confidence in making ‘wrong’ decisions and making systems collapse. These is also a fear of not having enough information, thus individuals are not primed and ready to include sustainability in their teaching or practice. Thus forming the barrier: Mistakes make systems fail; meaning we are not ready to include sustainability.

6: There is a lack of confidence in individuals’ perspectives of their own abilities (confidence).

Emerging from the data is the barrier that describes how participants lack confidence in their own abilities to include sustainability in the education and profession of design.
Examples ranged from a lack of self-assurance and not being an expert in the field, to being unsure as to the approach to take to include sustainability. The latter example is because of the difficulties associated with understanding sustainability. Thus indicating an individual’s lack confidence in their own abilities can create a barrier to the inclusion of sustainability in the teaching and practice of design. As a result creating this barrier: There is a lack of confidence in individuals’ perspectives of their own abilities.

7: There is a lack of transparency from the top to the bottom (understanding + support).

Embedded in a lack of understanding and combined with a lack of support is the barrier of a lack of transparency regarding current and future inclusion of sustainability. Some current practice is criticised as being greenwash (Lorenzoni et al., 2007), which can be argued as being worse than not doing anything at all (Shedroff, 2009). Consequently, a lack of transparency leads to the notion that everyone is claiming to be sustainable, but no one knows who is or is not genuine. However, there is the understanding that outside influences will force a change to increase clarity, such as rising petrol costs associated with peak oil. Therefore, this barrier concerns a lack of transparency between current practice and future practice and in turn creates the barrier: There is a lack of transparency from the top to the bottom.

8: If there is no demand, then there is no need (understanding + importance).

Falling under the category of a lack of understanding merged with a lack of importance is the barrier that if there is no demand for sustainability then there is no need for it. If designers (teachers and practitioners) cannot visualise a market demand for sustainability and design, then they cannot justify including it in their work (Ashford, 2004). Evidently, there is a lack of understanding of what re-orienting towards sustainability entails (P. M. Williams, 2008). In this way the barrier emerges through the notion that sustainability is not the ruling factor on decisions, plus there still remains the idea that it is hard to make a profit when making sustainable decisions. Thus creating the barrier: If there is no demand, then there is no need.

9: Evangelical people make sustainability a guilt trip for everybody else (understanding + confidence).

The two categories of a lack of understanding and a lack of confidence combine to produce this barrier. It is an amalgamation of the elements: c (v) I do not want to preach and d (iii) Sustainability is a guilt trip. Environmentalism can be a moral and spiritual movement, even a ‘religious quest’ for some (Dunlap, 2005). This extreme way of thinking can be described as reductionist and is reminiscent of the left wing political philosophies of environmentalism, which can be argued as being alarmist and motivating for some individuals, but is distinctly a deterrent for less liberal others (Larson, 2010). More liberal
individuals may well live by the less-is-more adage and argue that reducing personal consumption will lead to a greener life (Shu & Bazerman, 2010; Sibbel, 2009). However, for less left-wing individuals the proposition to reduce everything in their lives in order to save the planet is unrealistic and poses new and undesirable challenges (Bhamra & Lothhouse, 2007; Dewberry & Monteiro De Barros, 2006; Manzini, 1994). John Marshall Roberts defines eight ways of being human, and argues, the “green mind lives in a perpetual state of guilt for the sufferings of mankind” (J. M. Roberts, 2008, p. 122). He also describes “healthy and unhealthy green,” which the latter is defined as “love junkie/egalitarian warrior” and the former are individuals who listen and “actually care” (ibid.). It is therefore not surprising that some people preach about sustainability, which can make other individuals careful about how they are viewed by other people. Due to judgemental behaviours, some people who are interested in sustainability do not want to be seen as preaching. Moreover, evangelical individuals can provide unrealistic goals, which then fuel people’s self-doubt, in this way perpetuating attempts to be sustainable in every possible way. Thus framing the barrier: Evangelical people make sustainability a guilt trip for everybody else.

10: Single-issue ways of thinking about sustainability are polarising (understanding).

This particular barrier is underpinned by a lack of understanding, and is essentially the reason why sustainability is not included in the teaching and practice of design. Evident within the findings is the notion that sustainability is a loaded word, it means too many things and these meanings can often conflict. Moreover, a lack of understanding can come from single-issue ways of thinking about the problem. Single-issue ways of thinking can be commonly associated with reducing carbon emissions, or recycling, reduction or reuse. Thus leading to beliefs that sustainability constrains people’s freedom and provides another set of rules for people to live by. In this way, the interrelated nature of both design and sustainability falls short, leading to unachievable expectations and sustainability being seen as a threat rather than a series of opportunities (Charter & Tischner, 2001; Hagan, 2003). The underlying argument throughout this whole thesis is that both sustainability and design have many ‘wicked problems’, with no stopping rules, and without right or wrong decisions (Buchanan, 1992; Conklin, 2006; Wahl & Baxter, 2008). So a lack of understanding about different ways of thinking of sustainability and its relationship to design can be problematic, as a result the barrier is: Single-issue ways of thinking about sustainability are polarising.

Important Differences between the Literature and these Findings

Despite a wide range of obstacles being identified through analysis of data, some important barriers that did not emerge from my findings are discernable in other literature. This subsection briefly highlights these additional barriers.
Through the process of Integrating SD [Sustainable Development] into engineering courses at the Delft University of Technology (Peet et al., 2004), researchers found that some lecturers do not include sustainability in their courses because they are resistant to pressure from above. These individuals are also often expected to be a specialist in a discipline and do not want to spend time learning about how to implement sustainability (Boks & Diehl, 2006; Peet et al., 2004). Other barriers indicate that due to the excessive workloads of students, they rarely find time for extra-curricular activities involving sustainability (Calvo Roy et al., 2002).

Further research shows that barriers to environmental action are threefold, including discounting the future, having positive illusions about the future, and egocentrism (Shu & Bazerman, 2010). The former relates to how people often use an extremely high discount rate regarding the future, and as such tend to focus on overweighting short-term considerations (ibid.). Positive illusions refer to unrealistic optimism and illusions of control; for example, “technology will save us” (Lorenzoni et al., 2007, p. 450). This view is disputed, although it fuels the sceptics’ fire (Shu & Bazerman, 2010). Lastly, egocentrism attributes blame elsewhere; for instance, Copenhagen in 2009, where developing countries blamed developed countries for past and present problems, and vice versa, for not accepting responsibility for their excessive growth (Lorenzoni et al., 2007). Moreover, a barrier can encompass “[f]atalism,” including the concepts of: “It’s too late to do anything; We can’t do anything; and It’s a waste of time” (Lorenzoni et al., 2007, p. 450). A further barrier is reported as being: “[l]ack of political action by local, national and international government(s),” including “[d]istrust in governments to take responsibility” (ibid.). It is important to note, that these additional barriers were not reported through analysis of findings in the current data.

Key findings from my own analysis show two barriers that are not evident within current literature, namely 5: Mistakes make systems fail; meaning we are not ready to include sustainability, created from the categories of a lack of importance and a lack of confidence, and 6: There is a lack of confidence in individuals’ perspectives of their own abilities. A conclusion could be argued that some of the sample groups of designers lack confidence in their own abilities and the ability of others, as such become very critical if mistakes are made. It could be asked: is this barrier apparent across all of the sample groups or is it specific to some more than others? Accordingly, the following section addresses this question and explores the variations between barriers from the four sample groups of designers.

Variations of Barriers between the Sample Groups of Designers

This chapter has so far described a variety of obstacles to the inclusion of sustainability in the teaching and practice of design indicated by the four sample groups of designers, and complemented by current literature. In order to compare the variations
across the barriers and between the four sample groups of designers, it is necessary to ascertain commonalities between each of the participants. The graph in Figure 7.33 shows each group’s various barriers. Each bar on the chart represents a barrier. The names of the barriers are shortened, and the order re-arranged to distinguish those that are underpinned by values and ethics and those that are structural. The first group include, 3: Not a priority, 5: Mistakes, 6: No confidence, 8: No demand, 9: Evangelicalism, and 10: Single-issue. The remaining barriers are more structural: 1: No systems, 2: Hard to change, 4: No collegiality, and 7: No transparency.

![Diagram showing variations in obstacles from the sample groups of designers](image)

**Figure 7.33.** Diagram showing variations in obstacles from the sample groups of designers

Results reveal that the sample groups of teachers and practitioners indicate more obstacles than the sample groups of experts or students. This could be because the students have not yet had enough experience in sustainability, and therefore have not come across barriers to their practice. The experts, on the other hand, had relatively few obstacles to report, but those they did experience were more often underpinned by values and ethics, such as *A lack of confidence, Evangelical people make sustainability a guilt-trip for everyone else* and *Single-issue ways of thinking can be polarising*. In the latter case, the experts indicate a concern for others, who lack understanding of the complexity and breadth of sustainability. Moreover, the experts also indicate a structural barrier that there is often *A lack of transparency from top to bottom*.

For both the teachers and practitioners the barriers are broad and varied, with relatively equal amounts reported for both structural and values-based obstacles. A leading barrier for both of these sample groups is how *Internal and external systems are not in place*. The remaining barriers for the teachers and practitioners are indicated in relatively similar ways, with the exception that *Sustainability is not a top priority* (more for practitioners) and *Evangelical people make sustainability a guilt-trip for everyone else* (more for the teachers).
In summary, the findings show that the sample group of experts report relatively few barriers and those they do report tend to relate to how others understand sustainability, as opposed to themselves. Contrastingly, the teachers and practitioners indicate a relatively high number of varied barriers, although common between the two is how there is a significant lack of internal and external support.

**Summary and Conclusions**

The findings chapters have indicated how a wide variation in the meanings of both design and sustainability (Chapter four) affects the inclusion of sustainability in the teaching and practice of design (Chapter five). The previous chapter (six) then focused on drivers for the inclusion of sustainability. The drivers were varied, and showed interesting results when grouped into necessity and opportunity. Personal drivers for both sample groups of experts and teachers followed relatively similar patterns, while they were almost reversed for the professional drivers. In order to fully address the research problem, this chapter (seven) focused on the different barriers to inclusion. Results show four categories were created through the constant comparative analysis process. Elements within the category a lack of support were categorised as being a structural barrier. Elements within the three other categories, a lack of importance, a lack of confidence and a lack of understanding, reflected more psychological barriers. Some of these characteristics run throughout each category and as a result reduced the twenty elements (five in each category) into ten distinct barriers.

On the whole, this chapter has indicated there are many varied obstacles to the inclusion of sustainability in the teaching and practice of design, specifically derived from the sample groups of designers. It is important to note that the sample group of experts rarely reported these barriers, although concern regarding a lack of understanding of the complexity of sustainability through single-issue ways of thinking was raised. Barriers that were reported by the experts often were more associated with specific types of values as opposed to more structural barriers. A wide variety of both structural and value-based barriers are prominent for the sample groups of teachers and practitioners, but the most frequent and common between the two was internal and external support systems not being in place.

Interestingly, an obstacle has arisen that has not yet been reported within the literature that indicates that some designers doubt their own abilities, indicating they do not feel confident enough to include sustainability in their teaching and practice, because they lack an understanding of sustainability. Moreover, they report that this difficulty is due to not being an expert in the field, which is a barrier also indicated by a few of the experts. In the next and final chapter (eight), I draw conclusions from the findings discussed here. I also make recommendations towards designing scenarios for a more sustainable future.
CHAPTER EIGHT

CONCLUSIONS AND RECOMMENDATIONS:
DESIGNING SCENARIOS FOR A MORE SUSTAINABLE FUTURE

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Introduction

Change is often facilitated through education, so how might sustainability be included in the teaching and practice of design (and to what extent is it already) in Aotearoa/New Zealand?

This is the question I posed at the beginning of the thesis. As a researcher, educator, designer and a New Zealand citizen, I noted concern, both from others and myself, over how sustainability is included in the teaching and practice of design in New Zealand. In Chapter one, I proposed that designers are inherently implicated in creating the defuturing condition of unsustainability (Fry, 2009). Every design decision made can affect this condition, whether recognised or not. As indicated in Chapter three, I commenced this research study with a concept of sustainability that specifically focused on three sectors (economy, environment, and society) that intersect at one central point, which I interpreted as action. In other words, I disagreed with those who argued that the majority of design teachers were already including sustainability in one form or another in their teaching and practice (Durling, 2009). As an activist I could see little evidence of sustainability being included in the education and profession of design in this country. After carrying out this research I am left recognising that some of my concerns are valid, although my understanding of sustainability has developed so much that I must concede that David Durling’s arguments were, indeed, correct. Sustainability is being included in the teaching and practice of design in this nation in one form or another. However, as this journey has progressed the underlying problem has changed.

A crucial finding of this research is that some ways of thinking about design share common elements with some ways of thinking about sustainability. Designers are regularly faced with problems that are not easy to analyse; some are commonly called ‘wicked problems’, namely undefined, complex problems where solutions are neither simply right nor wrong, where there can only be a one-shot operation to find a solution, and where there is no stopping rule (Buchanan, 1992; Conklin, 2006). Competent designers are required to recognise such problems, and think and reason in particularly interrelated and complex ways in order to address them. For instance, as argued throughout this research study, designers are required to comprehend systems, have an ability to think critically and creatively and to appreciate consequences, make connections (with people, actions and environments), collaborate with other people, build communities and understand that a designer’s conduct and contribution will positively or negatively affect others. The concept of sustainability shares many of these elements (Mann & Bould, 2011; Palmer et al., 2007; Ryan et al., 2010; Shedroff, 2009; S. Sterling, 2001, 2004, 2009; S. Sterling & Thomas, 2006; I. Thomas, 2009; Tilbury & Wortman, 2004; Wahl & Baxter, 2008).
Identifying pathways to better practice for both design and sustainability requires critical, reflective thinking and the asking of deeper questions. Some of the designers from the four sample groups instinctively include sustainability through ‘better practice’ of their own discipline. Yet, importantly, some do not recognise that this better practice embodies sustainability, and that this intrinsic embodiment of sustainability is simply a by-product of their understanding of design. Some teachers, students and practitioners sampled in this research do recognise the deep-rooted connection between design and sustainability in their approaches. However, the majority of the designers sampled by this research within Aotearoa do not recognise these connections. A lack of understanding, confidence, support, and a failure to recognise the importance of working towards sustainable futures can and do obstruct the inclusion of sustainability in education and in practice.

This thesis contributes to the established literature in design, sustainable design, sustainable education and sustainable design education. Throughout the process I have explored a diversity of meanings of design and sustainability that underpin a variety of approaches to the inclusion of sustainability in the teaching and practice of design, and explored specific drivers and barriers evident from the four sample groups of designers. I commenced this research intending to shine a spotlight on some specific and finite barriers that might inhibit the inclusion of sustainability in teaching and practice, not only of design, but also of other disciplines and in doing so to suggest ways to overcome its exclusion. Instead, I discovered the significance of the phrase: sustainability is a journey and not a destination (Chapman & Gant, 2007c; Milne et al., 2006). In other words, in a world that is constantly changing, “sustainability is not some ultimate endpoint, but instead is a continuous process of learning and adaptation” (Wahl & Baxter, 2008, p. 72). Meaning, there are many different routes to be explored, and all which lead to a variety of solutions that could be better than the ‘defuturing condition of unsustainability’ that is currently prevailing. So, I suggest that sustainability can be included in the teaching and practice of design in many and varied ways. Often a lack of recognition of the extent of sustainability, and a focus on a more traditional reductionist view can, however, hinder integration.

Granted, some ways of thinking will lead to better understandings of sustainability than others. This study’s results indicate that an appreciation of complexity leads to more integrated, interrelated, transparent, and collegial approaches. This is evident regardless of differences in drivers and, more importantly, barriers. I have argued that designers, in particular, are inherently capable of these ways of thinking about sustainability because their discipline requires similar qualities necessary to recognise and address ‘wicked problems’. However, I further propose that some graduate attributes that link sustainability to education are not found in the discipline of design alone, instead they can be identified within a wide range of different disciplines (Mann, 2011; Mann & Bould, 2011).
The research problem, as revealed in this synthesis of arguments, is located within a theoretical framework entrenched in my ontological and epistemological understandings, which are all interlinked to my unique personal history and worldview. My assumptions about the nature of reality are deeply embedded in constructivism and, as such, I firmly understand realities are built through social and experiential interpretations of interactions with people, objects, and environments, between and across cultures (Creswell, 2003; Crotty, 1998; Grix, 2002; Guba & Lincoln, 1994). Moreover, my experiences and interpretations are influenced by my designerly way of thinking, which is inherently grounded in sustainability. Due to these influences, I acknowledge that my personal context could cause bias in interpretations of findings; in Chapter three I endeavoured to be as transparent as possible, discussing personal views alongside in-depth explanations of my methodology and methods. In each of the findings chapters, I strived for careful acknowledgement of the partial. Particular attention has been given to the analyses of data, creation of categories, the comparisons of these categories with the sample groups of designers, and subsequent hypotheses and discussions.

This final chapter draws the study to a close. It summarises and synthesises key findings from the wealth of data generated by the sixty-four participants formally interviewed for this study. The following sections discuss findings with regard to the six research questions that emerged from the literature review. In answering the final question, I provide some recommendations for turning obstacles into opportunities, but resist offering specific guidelines or detailed frameworks for a number of reasons. Despite my recognition of the positive meaning of the ‘journey’ metaphor, paradoxically the same analogy serves as a tool for some business-as-usual models, as opposed to the forward movement and positive progression of its original intention (Milne et al., 2006). Moreover, no one framework or golden rule can incorporate the complexity of sustainability (Shedroff, 2009). So, the perception that we need a disciplined procedure or prescriptive guidelines for the inclusion of sustainability is misconceived. This leads to the penultimate section, where I reflect on the study and suggest further research, then offer some concluding thoughts in the final section.

The Research at a Glance

Designing scenarios towards a more sustainable future is not a straightforward activity. It is a process that is entrenched in current ideologies of production, consumption and waste, embodies power struggles between making a profit and saving the planet, and communicates an absence of collegiality and transparency (Chapter one). This complexity is plainly visible in societal conceptions of design and academic notions of design research, sustainable design, sustainable education, and perceptions of sustainable design education. By examining these different fields, I suggest that designers are active contributors to social, environmental and financial change. I also propose that academic constructs of design have an underlying commonality: a way of ordering. However, solutions to intricate and complex
problems do not follow an orderly flow (Buchanan, 1992; Conklin, 2006; Klein, 2004; Rittel & Webber, 1973). These types of problems require integrated, critical and reflective approaches that are significantly different to those for ‘tame’ problems (ibid.). Moreover, design as an academic discipline is still growing and there is much complexity associated with design and design education; as such, there are many ‘wicked problems’ in design thinking, design education and design as a whole (Buchanan, 1992; Conklin, 2006; Neumeier, 2008; Wahl & Baxter, 2008). Furthermore, problems associated with unsustainability are as complex and ‘wicked’ in nature as some design problems. Incremental change that focuses on eco-efficiency and end-of-pipe solutions can create awareness of unsustainability, but research shows that this type of approach can cause further problems (Charter & Tischner, 2001; Manzini & Vezzoli, 2002; Sachs, 2003). However, when incremental change becomes part of a more holistic approach to make radical and fundamental change, then beginning with eco-efficiency can be one step on the road towards a more sustainable future (Shedroff, 2009; I. Thomas, 2009). Recognition of these complex problems and finding appropriate approaches to creative solutions, or designing scenarios for a more sustainable future, can also be identified as ‘wicked problems’ (Chapter two).

By unpacking the complexity of design and sustainability in the literature review, I have been able to recognise and accept my ontological assumptions that have enabled me to acknowledge my epistemological suppositions. This has let me subsequently identify how my knowledge and understandings have changed over the course of the research study, which is a process that was essential for the development of the research problem and questions. Accordingly, my way of thinking has progressed from a disparate comprehension of design and sustainability into a more homogeneous whole (Chapter three). This evolution is also attributed to data and analyses from four sample groups of designers. Specifically, these were: international experts (who are known to include sustainability in their discipline of design) and teachers, students, and practitioners of design from Aotearoa.

This range of sample groups represents a variety of voices from within the higher education of design; with this in mind, practitioners are included to represent the continued learning of a graduate within a profession. My intention was to demonstrate the difference in conceptions and approaches to the inclusion of sustainability within the teaching and practice of design, specifically to highlight the differences between experts and non-experts. Instead I discovered a wide variety of ways of thinking about design and sustainability; even more importantly, common elements between ways of thinking about the two concepts that emerged from the sample groups (Bould, 2009a). Such knowledge is indispensable for comprehending the broader implications of a concept where the problems have been popularly perceived through single-issue ways of thinking, and where solutions are typically end-of-pipe (Chapter four).
Alongside commonalities in ways of thinking about design and sustainability, emergent patterns from experts, teachers, students, and practitioners in approaches to the inclusion of sustainability in design were identified. A reasonable next step was to analyse how different ways of thinking can affect ways of including or integrating sustainability into the teaching and practice of design. In this way, I aimed to build on the differences and similarities evident for the sample group of experts, and also disclose how teachers and practitioners could augment their own understandings of design in order to better comprehend and integrate sustainability into their discipline. This investigation confirmed that not only do specific ways of thinking about design affect how sustainability is included in the education and profession of the subject; it also suggests that better understandings and ways of addressing the complexity and interrelated nature of ‘wicked problems’ within design can mean that sustainability is inherently integrated. Furthermore, analyses of findings suggest that a rebuild or redesign of curricula to integrate sustainability is not always necessary, especially if ways of thinking about sustainability are recognised as being interrelated, complex and of a similar nature to interrelated and convoluted problems associated with design (Chapter five).

So, are there links between drivers and barriers for designers to include or integrate sustainability into their teaching and practice? To follow up this question, I examined and cross-referenced the positive (Chapter six) and negatives (Chapter seven) of why sustainability was or was not included in design. A wide variety of drivers and obstacles to the inclusion or integration of sustainability into the discipline of design are evident from all four sample groups of designers. My goal in presenting these positives and negatives from the sample groups was to gain an insight into how obstacles can become opportunities for further integration of sustainability into teaching and practice. Ultimately, barriers to inclusion fall into four key concepts, a lack of: support, importance, confidence and understanding. In essence, the specific drivers gathered from the international experts in order to investigate how to overcome these obstacles reveal that the impetus can come from myriad sources and reasons, leading to the conclusion that any reason is a good reason to be involved and support can be found from a wide range of sources (further discussed in the Recommendations section of the current chapter). Therefore, the results of the study show that a better understanding of complexities and interrelationships of both design and sustainability are necessary in order to improve how the latter is included in the former (this proposition is also further discussed in the following section).

On the whole, I posit that in order to integrate sustainability in the teaching and practice of design, the focus must not be placed on changing how to include sustainability; instead, concentration should be applied to what we mean by the words ‘design’ and ‘sustainability’. My main argument concerns how sustainability has many ‘wicked problems’, which have no definitive right or wrong answers. In order to facilitate improving its inclusion, the first step is to acknowledge that it is acceptable to not know what the ‘right’
answers are and that there is no privileged information that only an elite few can access. Through this acceptance comes the understanding that sustainability is complex and interrelated. Then comes the understanding that there is no right and wrong way to include sustainability in the discipline and profession of design. With this in mind, I argue that single-issue ways of thinking about sustainability currently popular in New Zealand is better than not including sustainability. I also argue that better still are interrelated and complex ways of thinking that can lead to integrated approaches to including sustainability. I argue that there are imperatives for changing this understanding, through internal and external support, sustainability champions, and opportunities for professional development, thus enabling designers, educators and design practitioners in this country to contribute towards a sustainable vision for twenty-first century.

Thus, the sections that follow synthesise this research, drawing conclusions on the relationship between the research questions, literature and findings. Accordingly, the next section addresses the first research question.

**Commonalities are Evident between Design and Sustainability**

In the literature review, I discussed the concept of ‘wicked problems’. I concluded that designers address such problems on a regular basis (Buchanan, 1992; Conklin, 2006; Neumeier, 2008, 2009; Wahl & Baxter, 2008). Furthermore, these types of complex problems require different approaches than the single-issue ways of thinking appropriate for tame problems (Buchanan, 1992; Conklin, 2006). Conklin also indicates that, in order to cope with ‘wicked problems’, action is a better approach than research; for instance:

...wicked problems demand an opportunity-driven approach; they require making decisions, doing experiments, launching pilot programs, testing prototypes, and so on. Study alone leads to more study, and results in the condition known as ‘analysis paralysis,’ a Catch 22 in which we can’t take action until we have more information, but we can’t get more information until someone takes action (Conklin, 2006, p. 10).

His description outlines the precise problem plaguing the concept of designing scenarios for a more sustainable future. Therefore, in order to solve these ‘wicked problems’, new ways of thinking about design and sustainability that recognise and incorporate complexity are necessary (Buchanan, 1992; Conklin, 2006; Klein, 2004; Neumeier, 2008, 2009; Palmer et al., 2007; Wahl & Baxter, 2008). Some design communities do not adequately recognise this need, and continue to rely on ways of thinking that are more appropriate to addressing tame, or single-issue problems (Bhamra & Lofthouse, 2007).

Some ways of addressing the amalgamation between design thinking and sustainability thinking lead to associations with previously trialled design concepts such as ecodesign or green design. Both ecodesign and green design have a focus that specifically attempts to reduce environmental impact at every stage of the design process (Bhamra & Lofthouse, 2007; Hagan, 2003; Lewis et al., 2001; Madge, 1997; Tischner, 2006). Often the
focus is on material selection and construction, and the minimisation of energy, waste and pollution during processes of manufacture, transportation, and disposal (Hawken, 1993; Papanek, 1995; Stegall, 2006). These ideas are often associated with eco-efficiency, which is an important and necessary step towards more sustainable futures (Chapman & Gant, 2007b; Shedroff, 2009; White et al., 2005). However, eco-efficiency and incremental change is also associated with a stagnated response to sustainability (Fletcher & Goggin, 2001; Ramirez, 2007; Stegall, 2006; Whiteley, 1993). My findings indicate that some approaches to eco-efficiency can contribute towards the bigger picture of sustainability. I propose eco-efficiency and incremental change must be understood within a wider context in order to integrate sustainability into design education and the design profession.

My findings also show that the consideration of single-issue ways of thinking can have a polarising effect, meaning that a single-minded focus on reduction, combined (as it often is) with a single-issue way of thinking about design and sustainability, can limit the options for both. As such, this type of approach is inadequate to address the complexity and interconnectedness of decisions regularly encountered in the fields of both design and sustainability. Thus, focusing solely on reducing impact is limiting, incremental and can omit necessary considerations of relationships with society (Fletcher & Goggin, 2001; Ramirez, 2007; Stegall, 2006; Whiteley, 1993). In brief, single-issue ways of thinking about eco-efficiency tend to fall into the trap of seeking end-of-pipe solutions. Designers’ creativity can often be much better expended seeking holistic improvements than in trying to reduce and divert materials from landfills (Bhamra & Lofthouse, 2007; Dewberry & Monteiro De Barros, 2006; Manzini, 1994). A more integrated and analytical way of thinking is required to address the shortfalls of reductionist, end-of-pipe approaches within design and for sustainability.

Common elements between design and sustainability are evident from the wide variety of understandings of meanings of design and sustainability found within the sample groups of designers. This accords with much current sustainability-in-education literature, which promotes clear communication skills, being able to think broadly about systems, planning ahead, thinking critically and creatively, being reflective, comprehending quality, and working cooperatively in a variety of ways (AtKisson, 2008; Baumgartner & Korhonen, 2010; Dawe et al., 2005; Fien, 2002; Fien & Tilbury, 2002; Fien & Wilson, 2009; Hopkins & McKeown, 2002; Ryan et al., 2010; S. Sterling, 2009; Strachan, 2009; I. Thomas, 2009; Tilbury & Wortman, 2004; Wals & Jickling, 2002). These commonalities are also consistent with some sustainability-in-design literature that promote: transdisciplinary design dialogues (Bergeä et al., 2006; Dewberry & Sherwin, 2002), collaboration (Boks & Diehl, 2006; Rothstein, 2002; Tischner, 2006) and citizens as co-designers (Bergeä et al., 2006; Manzini & Jégou, 2003; Meroni, 2007; Wahl & Baxter, 2008). Thus, a set of common elements linking sustainability, design and education are proposed as essential considerations prior to, during and after decision-making processes, in teaching and practice. These elements are shown in Table
The table originated from comparisons initially made between design and sustainability (Bould, 2009a), which over time was developed collaboratively with Dr. Samuel Mann (Mann & Bould, 2011). Table 8.40 builds on this work.

Table 8.40.

Common Elements between Sustainability, Design and Education

<table>
<thead>
<tr>
<th>Elements:</th>
<th>Relating to Sustainability, Design or Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical thinking and reflective practice</td>
<td>A way of being able to think about the nature of knowledge, about the ways in which knowledge is produced and validate decisions using evidence and reflection</td>
</tr>
<tr>
<td>Creative thinking</td>
<td>A way of developing solutions through original ideas and concepts</td>
</tr>
<tr>
<td>Systems thinking</td>
<td>The ability to recognize the bigger picture and analyse and make connections between flows and processes</td>
</tr>
<tr>
<td>Appreciating consequences</td>
<td>An understanding that actions taken may have wide-reaching effects (for instance, may cross boundaries between time or place)</td>
</tr>
<tr>
<td>Making connections</td>
<td>Having an understanding of the interconnected relationships between people, actions and environments</td>
</tr>
<tr>
<td>Collaborating</td>
<td>Having an ability to work with other people</td>
</tr>
<tr>
<td>Building communities</td>
<td>An ability to establish relationships and interact with ‘affected parties’ such as with people, objects, services, and environments</td>
</tr>
<tr>
<td>Conduct</td>
<td>An understanding of a responsibility to make change and the skills (technical and social) to contribute</td>
</tr>
<tr>
<td>Contribute</td>
<td>A sense of wanting to be involved in making change and having ability to ask deeper questions</td>
</tr>
<tr>
<td>A sense of care</td>
<td>A sense of fair play for others (including all people and the environment)</td>
</tr>
</tbody>
</table>

These ten elements form my definition of sustainability. It is a definition synthesised from the explorations, analyses, discussions and reflection produced from this research, and builds on the work of significant individuals in the field of sustainability such as Dr. Emma Dewberry (Open University, England), Dr. Ian Thomas (RMIT, Australia), Dr. Stephen Sterling (University of Bath, England) and Dr. Samuel Mann (Otago Polytechnic, New Zealand).

My findings indicate that a fundamentally different way of thinking can be identified, specifically a more strategic and analytical approach to both design and sustainability. It is a particular means of assessing and reasoning that is applicable to a wider audience than just designers, and in this way moves beyond design as the context to a broader more sustainability-centric approach. Here, importance lies in the ability to see the bigger picture, be critical, reflective and creative, ask deep questions, understand that actions have wide-reaching effects, work collaboratively, make connections in order to benefit communities of people, build relationships between people, outcomes and environments (to name a few),
have a desire to contribute to change and, ultimately, have a sense of care and comprehension of the responsibilities for making change.

These latter elements, Conduct, Contribute and a Sense of care, are essential elements for design, sustainability and for education, but could be contentious issues due to potential correlations with personal ethics. As discussed in Chapter two, some researchers, despite promoting elements indicated in Table 8.40, assert that values and principles underpin these skill and ultimately can guide actions and as such inform education (AtKisson, 2008; Fien, 2002; Fien & Tilbury, 2002; Fien & Wilson, 2009; Hopkins & McKeown, 2002). I challenge these notions asserting that associating sustainability with a moral perspective can sometimes alienate a wide range of diverse individuals, because it causes a barrier (explored in further detail in Recommendations). I propose that to engage with individuals with differing principles it is essential to initially find a common ground. Therefore, I suggest that to augment how sustainability is included in the teaching and practice of many disciplines, it is important to focus on skill specific education.

In this way, all of the elements in Table 8.40 contribute towards the graduate attributes highlighted in Chapter two (Sustainable Education), including: employable, lifelong learner, prepared for an uncertain future, acting for the social good, adaptable to change, ability to promote change and is a community leader (Bosanquet, Winchester-Seet, & Rowe, 2010). In brief, these elements contribute to ways of thinking and reasoning for design, sustainability and education. The following section concerns these common elements, specifically the relationship between design and sustainability.

**The Effect of Specific Ways of Thinking about the Relationship between Design and Sustainability**

Chapter four, and the discussion above, identified commonalities between categories and revealed complex relationships between ways of thinking about each. In summary, a broad variety of understandings and ways of thinking about design and sustainability are evident from the study. Meanings also range from more single-issue ways of thinking such as the creation of tangible outcomes that are design centric and focus on designing for the user, or designing to reduce impact on the planet, to more complex and interrelated ways of thinking and designing. Links and connections can be identified and are consistent with much sustainable education and sustainable design literature. Chapter five, however, adds new elements to this literature by showing how different understanding affects inclusion or integration of sustainability and design, specifically in education. Therefore, this section draws conclusions from the research, findings and literature to address the second and third research questions.

Results from Chapter five show a variety of ways to include sustainability in design education and practice. These can be summarised as: [1] Sustainability can be included as a
specific component in a general design degree or in general design business (such as a one-off workshop on sustainable practice), and [2] Sustainability can be included as an indirect component in the general teaching and practice of design (such as a short project on simplifying the design of a light; here sustainability is not the focus, but can easily be discussed). Sustainability can also be included throughout the teaching and practice of design and be either [3] specifically or [4] indirectly labelled. For example, a designated, specialised sustainable design degree programme would focus on the complexity of sustainability and design through specifically integrating the subject into an entire degree. The latter option (no. 4) could mean that sustainability is indirectly built into the culture of a company or indirectly included throughout a general design degree. Thus, in this latter option every decision considers sustainability, but it is not separated from the design process.

On the whole there are a wide range of approaches regarding how sustainability can be included in the teaching and practice of design. Importantly, a distinction can be made between sustainability being included as an add-on component compared to sustainability being integrated throughout the discipline and profession. These results build on the work of Dr Emma Dewberry and colleagues (Dewberry & Monteiro De Barros, 2009; Dewberry & Sherwin, 2002; Fletcher & Dewberry, 2002). In Figure 3.20 (Chapter three) she illustrates the evolution from sustainability within the context of design to a more integral approach where design is within the context of sustainability (Dewberry & Monteiro De Barros, 2009, p. 31). My interpretation of findings indicate three steps, as opposed to Dewberry’s two. For instance, a relatively narrow understanding of the relationship between design and sustainability leads to the concept that Sustainability is a provision of design; more global understandings of design can lead to more global understandings of sustainability and, in turn, the two become interrelated: Design and sustainability are of equal importance. Further differences encompass a situation where sustainability is integrally included in design, leading to the suggestion that sustainability is of greater importance than design, thus indicating Design is a provision of sustainability. Therefore, the results indicate three underlying propositions, which directly influence how sustainability is included in the teaching and practice of design. These are:

If the relationship between design and sustainability is weak then single-issue ways of thinking can guide approaches to inclusion.

If the relationship between design and sustainability is strong then proactive, interrelated and complex ways of thinking can guide approaches to inclusion.

If designers understand the meaning of design as complex and interrelated, they potentially, and inherently, have the ability to include sustainability, some without necessarily recognising it as such.

These propositions are further explained in the following subsections.
If the Relationship is Weak: Sustainability is a Provision of Design.

Where a more limited understanding of design is evident, a more limited understanding of the meanings of sustainability is discernable and the relationship between the two is separate. Sustainability is then treated as an add-on component of design. The research shows that where design is understood as being an outcome or an activity (as opposed to a more complex and deeper understanding of the interrelationships of design to a wide range of decisions), it is common that sustainability is understood as a means of conserving the planet or finding ways to progress performance of outcomes (as opposed to the understanding that sustainability can be about building relationships). These understandings represent single-issue ways of thinking, and it is common that sustainability is therefore included as a separate, add-on component of design.

So, if the understanding of the relationship between design and sustainability is uneven and design dominates, then sustainability is typically understood to be a provision of design. Here, issues of sustainability are often considered through single-issue ways of thinking. The focus might be on diverting material from landfill or on being more efficient. This approach does enable design to effect incremental changes, such as recycling, reusing, dematerialising or saving energy. In this way sustainability is generally included in design education and profession as something separate to design, for example, an add-on component, or one off workshops.

However, this approach can be problematic to the broader understandings of sustainability if a reductionist or single-issue way of thinking is the main concern (Bhamra & Lofthouse, 2007; Dewberry & Monteiro De Barros, 2006; Manzini, 1994). For instance, a reductionist approach with a single-issue focus can be restrictive and misleading and can encourage designers to work within unsuitable boundaries such as focusing on working with recycled materials, or focusing on energy consumption or efficiency, or re-designing existing outcomes.

If the Relationship is Strong: Design and Sustainability are of Equal Importance.

My findings indicate a second understanding of the relationship between design and sustainability, in which Design and sustainability are equal. In this approach, sustainability is a specialised subject that is different, but equal, to design. Here, sustainability is embedded throughout the specialised course. This type of specific approach to inclusion communicates a particularly strong message to external audiences that integrating sustainability is in demand (Ramirez, 2007). However, here sustainability is still being treated as separate to design, despite it being understood as a more global, interconnected, and complex way of thinking.
When sustainability is treated as a different, but equally important, division of design, it becomes similar to other divisions of design such as “ergonomics, inclusive design, design for the aged, and design against crime” (Bhamra & Lofthouse, 2007, p. 39). This type of understanding of complexity and interconnectedness guides more integrated and flexible design solutions (Klein, 2004; Wahl & Baxter, 2008). Due to these deeper understandings and recognition of complexity, this proposition can be distinguished from the previous proposition, thus suggesting that from this perspective Design and sustainability are equal.

If the Relationship is Strong and both Design and Sustainability are Deeply Understood: Design is a Provision of Sustainability.

A third understanding of the relationship between design and sustainability is evident; it’s an insight that contrasts with the first and augments the second. Here, sustainability is integral to design, whether specifically or indirectly labelled, and as such sustainability is included throughout the teaching or it is embedded into the culture of the designers in practice. With this in mind, it is not about separating out the two: design and sustainability; rather, it is focusing on making design just good design, and in this way emphasising the importance of design thinking over direct inclusion of sustainability. Moreover, solely considering sustainability from within the parameters of design can be challenging due to the boundaries set by design, meaning the ability to address the complexity of sustainability becomes restricted (Dewberry & Monteiro De Barros, 2009). The first proposition allows for incremental changes and improvements, but hampers more progressive, complex understandings and approaches.

On the whole, design thinking within more integrative and transdisciplinary frameworks can create more critical, reflective, integral, and interrelated approaches (Klein, 2004; Wahl & Baxter, 2008). Challenging previous mental models and asking questions of the meaning of design can build strong relationships between design and sustainability; thus building on the previous proposition. Consequently, I regard the concept: Design is a provision of sustainability as at the top of a hierarchy of approaches.

In my study, some of the sample groups of designers who shared this perception of the relationship between sustainability and design exuded enthusiasm for sustainability. This is, of course, my own personal observation and one that is hard to validate, but it is worth noting nevertheless, especially since the least enthusiasm was evident from those who identified with Sustainability is a provision of design. However, there is an exception, which is that some designers inherently have the ability to include sustainability, despite lacking a passion for it because of their deep fervour for good design. Findings show that, despite a lack of understanding of sustainability, but with a deep, complex and interrelated understanding of design, some of the inherent problems associated with sustainability can be addressed.
In short, despite a practitioner not being an advocate of sustainability, or making it a number one priority, sustainability can be integrated into their teaching and practice due to their broad understanding of the deeper issues and complexities of design. Therefore, I propose that integrated design thinking that fosters critical, reflective, systemic thinking, combined with asking deeper questions of the meaning of design in order to add value, can inherently integrate similar elements of sustainability into the teaching and practice of design. In this way, my findings add to current literature to show that augmenting understandings of design can promote integrations of sustainability into education.

In Conclusion, Specific Ways of Thinking Can Affect the Inclusion of Sustainability in the Teaching and Practice, Not Only of Design, But Other Disciplines

As previously argued, designing for a sustainable future is a ‘wicked problem’ that necessitates different ways of thinking than for tame or single-issue type problems (Buchanan, 1992; Conklin, 2006; Klein, 2004; Neumeier, 2009; Palmer et al., 2007; Wahl & Baxter, 2008). Sustainability is better understood – and taught – as being interconnected and complex and thus approached as a separate whole specific degree or course, therefore indicating that design and sustainability are equal. If this were the case, then a whole redesign or rebuild of curricula to incorporate sustainability for a large number of institutions would be necessary. However, this has proven to be challenging in the majority of institutions where making changes to curriculums and programmes is taxing. Better still, I argue, would be to consider design as a provision of sustainability. From this point of view, sustainability is not separate at all; rather, it is fully integrated (specifically or indirectly) into a whole general design degree or design business. For instance, in the case of designing a new light, considerations could take into account the relationship between the object and the planet (such as energy use and efficiency, the manufacture process, materials used and people involved in these processes), the relationship between the user and object (such as desirability, durability, reparability and longevity), and the relationship between designers and communities of people (such as asking deeper questions of the meaning of light and its impact on different societal groups, and by exploring how designers and users can participate, collaborate and contribute to new creations that benefit people for the long term as opposed to the short term).

In brief, findings from the sample groups of designers support the notion that when design is the context, sustainability becomes an add-on to design (Dewberry & Monteiro De Barros, 2009). I propose that when sustainability is recognised as being similar to the elements in Table 8.40, then sustainability can become a frame of reference as opposed to an integral central focus or a separate addition; as such, better decisions can be made in order to create the types of change necessary to move towards designing a sustainable future. Thus, ways of thinking about design and sustainability directly affect how sustainability is integrated into the teaching and practice of design. I also propose that the common elements
between design and sustainability are not necessarily design-centric, but rather are generic skills that are more aligned with graduate attributes.

As a result, and in contrast to Sterling and Thomas’ (2006) suggestion that the only way to integrate sustainability into education is through a whole system/curricula rebuild or redesign, I propose this is not always necessary. Analyses of findings indicate that due to shared common elements, not only between design and sustainability, but also between sustainability and key graduate attributes, sustainability can be integrated throughout many disciplines. The drivers, of which, are the focus of the following discussion.

**Drivers for the Inclusion of Sustainability in the Teaching and Practice of Design can come from Anywhere**

This result indicates a wide variety of drivers identified in the data with regard to why the four sample groups of designers are including sustainability in design. Chapter six concerns these findings, the results of which produce some interesting patterns. Through the grounded theory approach and constant comparative method, five categories with varying numbers of elements emerged. These five categories were organised into professional and personal drivers. Underpinning these drivers are concepts of necessity and opportunity, and a comparison of the results shows similar patterns forming between the sample group of experts and the sample groups of teachers, specifically in terms of personal drivers. The drivers from the experts are greater in number; yet similar drivers are evident from the teachers. In particular, the majority of the experts indicate that sustainability is important, interesting and an intellectually stimulating opportunity.

Contrastingly, a comparison of the results for the professional drivers shows that the pattern for the sample group of experts is almost the reverse of that emanating from the teachers. The majority of the experts indicate that there is a form of necessity behind their reasoning of professional responsibility; for example, what they deem to be a real need for sustainability, or where the company they work for needs to be more accountable. This is quite different to the drivers that relate to better opportunities that are evident from the sample group of teachers. They indicate that sustainability means finding their own niche to work within, or that it is a good target to include sustainability within current business markets. These latter drivers are not motivated due to a values-perspective, rather from seeking an opportunity to find their specific niche or market. These types of drivers support my suggestion that sustainability does not necessarily have to be driven through ethics and morals.

Furthermore, it was noted that the sample group of teachers were more willing to include sustainability than previously assumed. This is significant, considering the sample includes all of the teaching staff involved with design in half of the tertiary design institutions in New Zealand. This is, of course, my own personal observation, and one that
is hard to validate, but it is worth noting nevertheless. Again, attention is drawn to the difference between moral obligation and seeking an opportunity.

In short, drivers to include sustainability can come from anywhere, whether personal or professional, due to necessity or through identification of an opportunity. Alternatively, the next section concerns the key barriers that obstruct the inclusion of sustainability in the teaching and practice of design.

Obstructions to the Inclusion of Sustainability in the Teaching and Practice of Design can come from Anywhere

So far, I have argued ways in which sustainability can be included, through accounts given by the sample groups of experts, teachers, students, and practitioners. This section explores the barriers that could potentially obstruct its inclusion. In doing so, I address the penultimate research question. Ten distinct barriers from Chapter seven are underpinned by a lack of understanding, support, importance, and confidence. These barriers are summarised as:

1. Internal and external systems are not in place to assist with the inclusion of sustainability
2. There is a reluctance to change current practice
3. Sustainability is not a top priority
4. There is often a lack of collegiality within or between departments
5. Mistakes make systems fail, meaning we are not ready to include sustainability
6. There is a lack of confidence in individuals’ perspectives of their own abilities
7. There is a lack of transparency from the top to the bottom
8. If there is no demand, then there is no need
9. Evangelical people make sustainability a guilt trip for everybody else
10. Single-issue ways of thinking about sustainability are polarising

The sample groups of teachers and practitioners report the majority of the barriers. It is evident within the findings that the experts rarely indicate obstacles, when they do, however, the barriers concern how other people might misunderstand sustainability, which could potentially lead to a lack of support, importance or confidence. Significantly, some of the sample groups of experts indicate that they lack confidence, although they still passionately include sustainability; this finding implies that within each obstacle lies an opportunity for inclusion. As such, the final research question addresses this notion and is explained below.
Recommendations

The following recommendations are derived from answering the final research question. These recommendations are intended for use by anyone wanting to include sustainability in the teaching and practice of design, but can also be adapted for other disciplines. They are supported by four different components of my thesis. Firstly, they are based on accounts of processes for implementing sustainability in the teaching and practice of design from a sample group of international academic experts, which provides the basis of the recommendations. Secondly, accounts from three sample groups of teachers, students and practitioners supply information on what is already being included in the teaching and practice of design in New Zealand. Thirdly, the broader scholarly literature on the topic of implementing sustainability in education, design and many other disciplines, including many case study descriptions, has provided a wealth of information. Finally, the significant research findings that are described above reinforce these recommendations that are explained in full below, and which address the final research question:

6. How might obstacles become opportunities for the inclusion of sustainability in the teaching and practice of design in Aotearoa?

Four categories of barriers identified in Chapter seven include a lack of support, a lack of importance, a lack of confidence, and a lack of understanding. These categories and their interrelated elements form the basis for the ten different barriers listed above. This section focuses on how these obstacles can become opportunities with a slight shift in perspective.

Analyses of data indicates differences in approaches to understanding and implementation between those who already include sustainability in their teaching and practice and those that want to, but are not sure how. As discussed in the previous chapter, a variety of obstacles can sometimes stand in the way. This section focuses on how these obstacles can be turned into opportunities, and is based on the experiences of those who have already done so. Results can be summarised as:

Some barriers to inclusion are underpinned by a lack of understanding: Therefore, augmenting ways of thinking about sustainability and igniting inspiration can increase understanding.

Some barriers to inclusion are underpinned by a lack of confidence: Therefore, developing capability and connecting to others’ shared visions can increase confidence.

Some barriers to inclusion are underpinned by a lack of importance: Therefore, nurturing an understanding of the interrelationship of sustainability with design and developing enthusiasm can increase importance.

Some barriers to inclusion are underpinned by a lack of support: Therefore, divergent, motivated thinkers can find or create necessary support.
These four key findings are elaborated in the following four subsections. Each subsection focuses on identifying opportunities for each of the barriers outlined above. The sequence of the ten barriers is reversed, in order to logically explain and elaborate on each.

Augmenting Ways of Thinking about Sustainability can Increase Understanding

A lack of understanding of sustainability forms the basis of the majority of the barriers to sustainability listed above, a concept fully explored in this thesis. Often barriers emerge due to misconceptions of what sustainability is or what it can be. As previously argued, some ways of thinking about design can be limiting and detrimental to the creativity of designers. Thus, this section considers how these misinterpretations can underpin some of the barriers and how findings from experts indicate that current understandings of sustainability can be augmented. This, in turn, transforms a barrier into an opportunity for inclusion, potentially Igniting Inspiration (J. M. Roberts, 2008) for learning. These are summarised below, with the ‘opportunity’ highlighted in bold:

10. Single-issue ways of thinking about sustainability can be polarising
   a. Understanding sustainability has many ‘wicked problems’ and requires interrelated and complex thinking in order to pursue solutions

9. Evangelical people make sustainability a guilt trip for everybody else
   b. Sustainability does not need to be a guilt trip

8. If there is no demand, then there is no need
   c. Some ways of thinking about design share common elements with some ways of thinking about sustainability and education; therefore inclusion does not have to be demanding, and it can be interesting and intellectually stimulating

7. There is a lack of transparency from the top to the bottom
   d. Increasing transparency in teaching and practice of design can overcome some obstacles, especially those relating to a lack of understanding

These four barriers (10-7) were described in Chapter seven and can become opportunities (a-d) by augmenting understanding of the wider, interrelated meanings of sustainability discussed in this thesis. These opportunities are discussed and concluded in the following subsections.

   a. Sustainability has many ‘wicked problems’.

10. Single-issue ways of thinking about sustainability can be polarising. This particular barrier has been a focus of a large section of this thesis. As indicated throughout this study issues associated with sustainability are complex and interrelated, as a result single-issue ways of thinking about these problems can be limiting. Thus, in order to turn this barrier into an opportunity, an understanding of what is meant by a single-issue way of thinking about sustainability is necessary. An example could be where sustainability is understood to be an end-of-pipe type approach, such as conserving or cleaning-up initiatives (beach clean-ups, recycling strategies, reduction of packaging proposals, energy efficient incremental
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changes, down cycling of materials, or more personally, a refusal to fly). These actions can be reactive (beach clean-ups) and based upon moral preconceptions (refusal to fly). Initiated unaccompanied or with minimal background information, these single-issue focused actions can hinder sustainable progress by polarising specific issues and reinforcing a reductionist view of sustainability. If, however, these actions are part of a bigger endeavour, accompanied by information and educational strategies, then they can create awareness about a wider range of complex issues.

So turning this barrier into an opportunity not only focuses on finding better ways to enhance natural environments, propagate healthy agriculture for food and fuel, increase biodiversity, access clean technology, advance civic engagement, create transparent markets, generate cleaner manufacturing and help cultures thrive, it is also about finding ways to ignite inspiration in others. [Note: Igniting Inspiration is a subject deeply explored in a book by the same name by John Marshall Roberts (2008)]. In summary, understanding sustainability has many ‘wicked problems’ and requires interrelated and complex thinking in order to pursue solutions.

b. Sustainability does not need to be a guilt trip.

Single-issue ways of thinking combined with a reductionist view can create huge rifts between what is and what is not deemed acceptable with regard to sustainable living, thus creating the barrier: 9. Evangelical people make sustainability a guilt trip for everybody else. Even the experts in my sample acknowledge feelings of guilt over their wrong decisions and actions deemed unsustainable. These feelings become more challenging when applied to other people; judgemental behaviour from evangelical individuals delays the progression of sustainability and amplifies the misconception that sustainability focuses on some sort of moral notion of ‘being green’.

However, understanding sustainability and designing for a sustainable future is a ‘wicked problem’ with no right and wrong answers, no stopping rules, and no given alternative solutions. Sustainability is constant, it cannot be turned off, and it is affected by a wide variety of political, environmental, cultural, societal, financial decisions. With recognition that every decision is within a frame of reference of sustainability, that these decisions are either better or worse than current practice, and that with each decision comes new questions, new connections and new problems can propagate deeper understandings of sustainability. Significantly, each decision can increase confidence and ideally move away from feelings of guilt, thus turning this barrier into an opportunity by a slight change in perspective of the meaning of sustainability away from ‘being green’ and towards making connections, asking deeper questions, thinking collaboratively or any number of other ways of thinking common with better practice (such as elements in Table 8.40). In summary, sustainability does not need to be a guilt trip.
c. Design, sustainability and education share common elements.

Barrier 8. If there is no demand, then there is no need is evident in how sustainability can be disconnected from decisions and put on hold to deal with at a later date. There is the idea that including sustainability now will incur vast sums of money, for instance, to hire consultants to re-educate the workforce, to redesign curricula, or to hire other consultants to inform businesses of what they are doing wrong, and how they can change their current practices. Thinking about sustainability in this way leads to the conclusion that there is not enough demand to warrant these changes.

However, as indicated previously some ways of thinking about design are synonymous with some ways of thinking about sustainability. If design thinking can foster critical, reflective and collaborative thinking and the asking of deeper questions in order to add value and build relationships between communities of people, then sustainability can be included. Furthermore, throughout this thesis I have clearly indicated the vast amount of research in this field already, and in the second chapter I demonstrated how it is growing at a rapid rate. Therefore, I argue there is a demand for designers, as well as educators, researchers and practitioners of any discipline to develop more interrelated and integrated ways of thinking in order to recognise better practice within their own discipline. In this way, recognition of existing elements of sustainability (Table 8.40) and making the connections between each thus augments current practice within a frame of reference of sustainability.

Moreover, the sample group of experts indicate that it is an opportunity (for them) to be involved with sustainability, not only because it is deemed important, but also because it is interesting and intellectually stimulating. Some of the Aotearoa-based teachers indicate they are involved in this field because they identified an opportunity to seek a niche or to fill a market. Thus, this barrier can become an opportunity by recognising how this topic of research is a growing, exciting and inspiring domain that can expand and enhance disciplines. Consequently, a slight change of mindset can alter the headache of including sustainability into the reality that sustainability is just better practice of teachers’ and practitioners’ own disciplines. In summary, some ways of thinking about design share common elements with some ways of thinking about sustainability and education; therefore, inclusion does not have to be demanding, and sustainability can be interesting and intellectually stimulating.

d. Increasing transparency in teaching and practice of design.

Underlying the seventh barrier (7. A lack of transparency) are suggestions of greenwash and untrustworthy claims of sustainability. Furthermore, a lack of transparency can also refer to the wants at the top and the needs at the bottom of a business, thus causing disparity and confusion. In order to address misunderstandings and disparity, an increase
in transparency between and across companies, institutions and individuals can improve collegiality. Emerging from the sample groups of designers is a desire to achieve more openness and honesty, and for businesses not to claim what they are planning to do, but to celebrate what they are currently doing. In this way, transparency within the workplace can provide better support and a better collegiality of intentions and objectives; both of these suggestions are further explored below in j. Implementing sustainability champion and external networks and g. Increase collegiality.

Consequently, turning this barrier into an opportunity through celebrating what is being achieved as opposed to what is planned is an option. Thus, potentially opening up business and teaching models to create open source, or easily accessible information about supply-chains, manufacturing procedures, waste and water or any other type of complexity, where sharing resources, ideas and solutions can help others. In summary, a structural approach to increasing transparency in teaching and practice of design can overcome some obstacles, especially those relating to a lack of understanding.

Increase Confidence, Develop Capability and Connect to Others’ Shared Visions.

A lack of understanding forms the basis of the four barriers discussed above, and can also be identified in some of the barriers discussed in this section. Chapter five revealed how a lack of confidence can be identified in some of the sample groups of designers. Surprisingly, in some instances, this finding includes some of the sample groups of experts, who indicated a lack of self-assurance in terms of sustainability. However, the experts also assert that they do not consider confidence to be a barrier; instead, they indicate it can be a driver by subsequently seeking help from or confidence in other people, even finding their own niches and creating their own visions. In this section, four specific barriers (detailed in Chapter seven) share the underpinning notion of a lack of confidence. One of these barriers, 9. Evangelical people make sustainability a guilt trip for everybody else, is also underpinned by a lack of understanding and was discussed above in b. Sustainability does not need to be a guilt trip. Turning the remaining three barriers into opportunities can be summarised as:

6. There is a lack of confidence in individuals’ perspectives of their own abilities
e. Gain confidence in own abilities by fostering critical, reflective and collaborative thinking

5. Mistakes make systems fail, meaning we are not ready to include sustainability
f. Granted mistakes can make systems fail, but they can also be used to critique and reflect; thus, asking why these mistakes are occurring can help overcome this barrier

4. There is often a lack of collegiality within or between departments
g. Increased collegiality between experts, non-experts, colleagues, individuals and society can be achieved through increasing transparency and the understanding that design and sustainability share common elements
The three potential opportunities (e-f) for barriers (6-4) are discussed and concluded in the following subsections.

**e. Gain confidence in own abilities.**

6. A lack of confidence in own abilities. This particular barrier is revealed by a number of the sample groups of designers, sometimes specifically in what they say, and at other times due to how they discuss what they do. Some described how a lack of understanding of sustainability meant that it can be placed in the too hard basket and not addressed. Also many of the direct quotations captured feelings that individuals themselves were not experts in the topic, which created insecurities. This barrier can be turned around and transformed into an opportunity by the suggestion that no one is really an expert in sustainability, due to it being plagued by ‘wicked problems’; I have argued before that these types of problems have no stopping rule, no right and wrong, and some solutions can cause additional problems. The sample group of (those whom I call) experts indicate they use these insecurities to find their own niche or to learn more from other people involved in similar areas. Consequently, this barrier of a lack of confidence in being able to include sustainability in the teaching and practice of design can be turned into an opportunity by sharing ideas, connecting to other people and, in the process, growing capability. In short, confidence can be gained by fostering critical, reflective and collaborative thinking.

**f. Ask why these mistakes are occurring.**

A barrier evident from the sample groups of designers is: 5. Mistakes make systems fail; we are not ready for this. Once again, the basis of this barrier could be argued as being a lack of understanding. To clarify:

...mistakes are deficiencies or failures in the judgemental and/or inferential processes involved in the selection of an objective or in the specification of the means to achieve it, irrespective of whether or not the actions directed by this decision-scheme run according to plan (Reason, 1990, p. 9).

Mistakes can be due to human error, but they do not necessarily make systems fail. “Systems should help users understand and recover from mistakes easily” (Shedroff, 2009, p 191). Moreover, mistakes are important for learning (Tjosvold, Yu, & Hui, 2004). However, acquiring the skill to learn from mistakes can be challenging, although strategies such as “cooperative goals and problem solving promote learning from mistakes” (ibid., p. 1223) and are approaches compatible with sustainability. On the whole, sustainability is about tolerating mistakes and acknowledging that it is acceptable not to know all the answers. Therefore, this barrier can become an opportunity through augmenting understanding, using systems and accepting mistakes, then using them as a reflective, learning tool. In brief, mistakes can sometimes make systems fail, but they can also help understanding and recovery.
g. Increase collegiality.

4. A lack of collegiality. The basis of this barrier comes from a lack of support merged with a lack of confidence, but it is also underpinned by a lack of understanding. The latter, as described above, can be improved through differences in thinking about sustainability. Overcoming a lack of support is described in the subsection below (see j. Implementing sustainability champion and external networks); therefore this subsection considers a lack of confidence, which in relation to this particular barrier is threefold.

The first part reflects aspects of barrier: 9. Evangelical people (see opportunity: b. Sustainability does not need to be a guilt trip). Here, a division between some people can be identified due to their ways of thinking about sustainability and perceptions of how people ‘should’ behave. Barriers identified from the four sample groups of designers (the experts included) assert that judgemental behaviour towards other peoples’ decisions lacks support and can reduce confidence. As indicated above, some techniques to overcome this barrier are better ways of thinking about sustainability and more transparency throughout decision-making processes. This promotes confidence and better collegiality between experts and non-experts, as better practices are shared and become less polarised.

A second part of this barrier is the fact that a lack of collegiality between colleagues can inhibit teammates’ and co-workers’ understanding of sustainability; therefore, a lack of confidence is evident, because individuals assume they have to take a risk. This concept can also be reflected in a third part of the barrier, which is a similar lack of confidence found within the general population (for instance, the sample group of students). Consequently, those who are passionate or beginning to address issues of sustainability indicate they feel alone in their sustainability endeavours. Turning this barrier into an opportunity is, once again, grounded in meanings, collaboration and learning from other people. In this way, growing a collective understanding is essential, especially when notions of sustainability are closely linked to values and ethics. In order to locate common understandings, asking the meaning of sustainability for each stakeholder is important. Sharing knowledge and creating collegiality between staff and individuals means that doors of opportunity can be opened to new ideas and innovative approaches. Thus, turning the barrier around to become an opportunity for all individuals to find their niche means sharing resources and sharing visions for a more sustainable future. In summary, an increase in collegiality between experts, non-experts, colleagues, individuals and society can be achieved through increasing transparency and the understanding that sustainability and education can correspond and interrelate.
Nurture Importance Through Understanding Interrelationships and Developing Enthusiasm.

On the whole, barriers that are structured around a lack of importance could also be argued as being based on a lack of understanding. A lack of importance comes with the idea that sustainability is a division of something unknown, that it is separate and limiting; the findings of this thesis indicate that there is another, more holistic way of addressing sustainability. Alternative ways of thinking about sustainability that grow out of the ideas and conceptions already associated with designerly ways of thinking are complex and interrelated. These ideas are not just connected to design, but can relate to more global ways of thinking, where critical, reflective and lateral thinking leads to the asking of deeper questions in order to add value to education or to practice.

In this way, thinking about sustainability as additional to a discipline, or as an impossible task because of a lack of understanding or confidence can be eliminated and be replaced by an understanding that sustainability can be implemented by augmenting understandings in more familiar disciplines; for example, through collaboration, sharing of information and making decisions in order to achieve ‘better practice’. Therefore, the four barriers that share a lack of importance can be turned into opportunities with slight changes in perspectives. Two of the four barriers, namely: 8. If there is no demand, then there is no need and 5. Mistakes make systems fail, meaning we are not ready to include sustainability were already discussed above, the former because it shares a lack of understanding and the latter because it shares a lack of confidence. The remaining two barriers can be summarised as:

3. Sustainability is not a top priority
   h. Sustainability does not need to be a top priority; it can be integrated into design thinking

2. There is a reluctance to change current practice
   i. If design fosters critical, reflective, and collaborative thinking then, through the adoption of better design practice, changes will be made

Ways of turning these two barriers (3 and 2) into opportunities (h and i) are highlighted in bold and are further discussed and concluded in the following two subsections.

h. Sustainability does not need to be a top priority.

This particular barrier: 3. Sustainability is not a top priority resonates with a lack of importance and, as previously indicated, a lack of importance is grounded in a lack of understanding. Moreover, sustainability is not a top priority in the majority of cases; for instance, where it is included in the teaching and practice of design in New Zealand. Granted, as argued above, some of the ways of thinking about sustainability and therefore how it is included have the potential to be augmented, but the fact that sustainability does not have to be a priority to be included is a significant finding.
Some of the sample groups of experts indicate that turning sustainability into a higher priority can be achieved by identifying how being seen as a leader in this field is more beneficial than being seen as a follower. Thus, this barrier can be turned into an opportunity by accepting it does not have to be a priority; furthermore, it makes business sense to be involved ahead of the game. In summary, sustainability does not need to be a top priority; it can be integrated into design thinking.

**i. Through the adoption of better design practices, changes will be made.**

2. **Reluctance to change current practice.** This barrier originates from a lack of importance, but also, like many others, it is due to a lack of support, collegiality, and understanding. As proposed throughout this final chapter, some ways of thinking about design and sustainability share common elements with some specific graduate attributes. Therefore, if current design practices foster critical, systemic and strategic thinking, reflective practice, working collaboratively, making connections and building relationships between communities of people, then sustainability is already being included. If design practices do not include broad and interrelated ways of thinking, then it may be necessary to pursue the augmentation of deeper understandings of the meanings of design. This can be achieved through research programmes and a focus on theory alongside practice. Designers need to recognise the complexities and interrelationships of design if this barrier is to become an opportunity. In summary, if design fosters critical, reflective, systemic and strategic thinking, then changes will be made through the adoption of better design practice.

**Support Divergent Thinkers and Get Motivated.**

Support can come from a variety of sources; therefore, a lack of support can be equally varied. However, one particular incentivising technique (financial incentive) to support and encourage the inclusion of sustainability, identified by the sample groups of practitioners, can be argued as being restrictive. For instance, direct incentives are devastating for the complex and interrelated ways of thinking about sustainability that require heuristic approaches (Pink, 2010). Instead, motivation to include sustainability must be self directed, engaging and for a purpose (ibid.).

Four barriers share a lack of support; the majority have already been discussed and concluded. One barrier remains:

1. Internal and external systems are not in place to assist with the inclusion of sustainability
   j. **Internal support systems can include a sustainability champion, and external support can come from international and national networks**

Turning this barrier (1) into an opportunity (j) is discussed and concluded in the following subsection.
j. Implementing sustainability champion and external networks.

Emerging from the findings is the fact that support is necessary, whether internal, external or both. Barrier: 1. *Internal and external systems are not in place to assist with the inclusion of sustainability* is built on the opinion that when support is missing, some individuals find it more challenging to include sustainability. Restrictions can be traced back to a lack of understanding, importance and confidence; thus, this type of obstacle can be turned into opportunities through most of the suggestions explored in the preceding opportunities. Moreover, better support can be implemented internally through peer-to-peer assistance from a champion for sustainability. In this position, additional time allowance is necessary in order to cross-pollinate ideas, grow a culture of sustainability and work individually with those who lack confidence or understanding.

Support from the top is advisable, specifically in order to help augment understanding, but not to re-train the workforce. Assistance from the bottom is also beneficial in order to locate and access international networks and establish support systems, sharing of resources and ideas and collaboration across disciplines, all of which can address potential problems of support. In some instances, this type of assistance could be a specific position (sustainability champion or advisor), dedicated to enhancing and growing understanding, leading to the strengthening of inclusion. Thus, turning this barrier into an opportunity relies on augmenting understanding, increasing confidence and growing importance and, on the whole, defending divergent thinking. In brief, internal support systems can include the concept of sustainability champions, and external encouragement can come from national and international networks.

**In Conclusion, These Ten Barriers can Become Opportunities with a Change of Mind Set**

Key findings within this research indicate how a lack of understanding of the complexity of sustainability is causing barriers to its inclusion in the teaching and practice of design. With help from internal and external support, from awareness raising and further education (not re-training, simply augmenting current practice), collaboration, critical reflective thinking, getting inspired and through becoming motivated, all of these decisions can make significant changes to improving how sustainability is currently being included in the teaching and practice of design.

Each of the barriers evident within this research study has been explored within this section and new opportunities for change identified. The predominant finding is that understanding of the interrelationships and complexities associated with ways of thinking about sustainability is lacking and, as such, single-issue views dominate, which potentially limit support, confidence and importance. Thus, a wide variety of opportunities have been suggested, which can be interpreted as recommendations. Accordingly, the following section reflects on this current research study, limitations, successes and beyond the research.
Reflections About and Beyond the Research

This thesis has brought together a wealth of current knowledge from academics worldwide combined with teachers, students and practitioners from the island nation of Aotearoa to suggest a different way of approaching the inclusion of sustainability into the teaching and practice of design. In bringing these ideas together and through the process of data analysis, new approaches to thinking about the relationships between design and sustainability were discussed, along with shared elements between design, sustainability and education.

Reflections on the Research Study

If given the opportunity to repeat this research study there are some aspects that would deserve further attention. This transdisciplinary research project commenced from within the disciplines of design and higher education. As the study progressed critical analysis dominated the fields of design, sustainable design, sustainable education and sustainable design education. The thesis is heavily weighted towards primary research material specifically in the fields of design (education and practice) and sustainable design education. This might be to the detriment of a more satisfactory explanation of concepts within higher education (such as a critique of graduate attributes, action competence models or experiential learning), and within business (such as corporate social responsibility) that may well have been beneficial for the study. Nevertheless, the comprehensive treatment given to unpacking the complexities of societal conceptions of design and to the theory, teaching and practice of design, also to sustainable design, sustainable education and sustainable design education was invaluable for establishing agents of change. However, I would prefer to elaborate on the constructs within higher education and business by way of future communications based on evidence presented in this thesis. I do not believe this thesis lacks credibility as a result of their limited exposition; rather the emphasis on alternative matters was a deliberate choice in terms of how to tell the story.

There are some changes that I would welcome the opportunity to make, however, which relate to my sample groups of designers. When I began the research I had hoped to interview some of the leading researchers in my field, I achieved this goal with some, but the opportunity with some significant others passed by due to time (on their behalf) and monetary constraints (on my behalf). Also, I had hoped to achieve saturation sampling with Aotearoa-based teachers, but due to a number of reasons only half of the design departments within higher educational institutions in this country accepted the invitation to participate.

Additionally, through a purposeful sampling technique, the two sample groups of students were specifically chosen due to apparent differences in ways sustainability was included for each group. However, during the analyses of data a wider range of approaches to inclusion were obtained; in hindsight, it would have been beneficial to recruit a greater
number of students who experienced each approach. In this way, different understandings of sustainability from each student group and comparisons between conceptions could be analysed.

**Additional Research Opportunities**

The above gaps in my own work present opportunities for ongoing research in this area. Firstly, I identified how sustainability could be included in the teaching of design through a number of ways, as indicated above, further research into the effects of each of these different approaches on groups of students is necessary to gain an appreciation of their distinct understandings. Accordingly, researchers are currently conducting a benchmarking study specifically to address sustainability in tertiary education in New Zealand (Mann & Kearins, 2010; Shephard, Mann, Smith, & Deaker, 2009). In a similar way, Dr. Samuel Mann and I (Mann & Bould, 2011) have commenced research into final year students’ capstone projects in order to understand their different conceptions of sustainability.

Secondly, I propose that due to common elements between design, sustainability and education, sustainability can be integrated into a variety of disciplines through more skills-based approaches as opposed to more values-based ones. Further research into the end-result of this proposition is necessary, such as: if sustainability is whittled down to only the essential elements, as opposed to being grounded in values and ethics, will it be enough to effect change on current unsustainable patterns of production, consumption and waste?

**Towards Designing Scenarios For a More Sustainable Future in Aotearoa/New Zealand**

Since I started this thesis I have been employed by an educational institution (that is not part of the research study) with a capacity building role, charged with generating confidence and capability for learning and teaching sustainability amongst staff within different departments. In this position, I appreciate how forward thinking decision-makers can be in order to ground sustainability into the teaching and practice of a wide variety of disciplines (Birnie et al., 2008). Moreover, I have had the opportunity to experience how my findings are relevant to some staff members; especially those who have struggled to understand the relevance of sustainability in their particular departments. These influences add to my own interpretation of the meanings of findings in the study and reveal research limitations and further research.

This research study is part of a wider network of sustainable action, research, teaching and practice. There are many exciting initiatives occurring every day around the world in terms of the interconnections between ‘wicked problems’, design and sustainability and the designer’s role in accelerating better solutions (Klein, 2004; Neumeier, 2009; Wahl & Baxter, 2008). Moreover, researchers are continuously exploring different and better ways to incorporate sustainability in education (see for example, Baumgartner & Korhonen, 2010;
Dawe et al., 2005; Fien, 2002; Fien & Tilbury, 2002; Fien & Wilson, 2009; Hopkins & McKeown, 2002; Ryan et al., 2010; S. Sterling, 2009; Strachan, 2009; I. Thomas, 2009; Tilbury & Wortman, 2004; Wals & Jickling, 2002).

Sustainability initiatives, research and action are being implemented in Aotearoa/New Zealand through the inspiring work of many different people such as those identified on the ReGeneration road trip (J. Roberts & Bolstad, 2010), or the case studies of engaged people working towards inclusive communities (Thompson-Fawcett & Freeman, 2006). This is also true of tertiary educational research such as Sustainability In Higher Education In The Asia-Pacific: Developments, Challenges, And Prospects (Ryan et al., 2010) The Green Graduate (Mann, 2011) and a recent PhD study into how to create future leaders in educational institutions (P. M. Williams, 2008). The redefinition of how sustainability is understood within the country is also underway (Sustainable Aotearoa New Zealand, 2009), alongside assistance for business (see, Sustainable Business Council) and a push from central government (Parliamentary Commissioner for the Environment, 2004). All of these approaches and actions are interconnected and intertwined together they can expand sustainable education across teaching and practice in this island nation.

Concluding Thoughts

In this thesis I opine that there are many different ways of thinking about and including sustainability in the teaching and practice of design; the key is understanding that every way can be worthwhile with a little critical thinking, reflection and connections to the bigger picture. As such, recognising similarities between ways of thinking and reasoning about sustainability can augment how sustainability is integrated into the education and profession of design. Granted, values are often at the core of sustainability and sustainable development (Fien & Wilson, 2009; Tilbury & Wortman, 2004), but I propose that there is an opportunity to engage a wider and more diverse range of individuals if values are left on the sideline.

Reflective practices, alongside critical, systemic and holistic thinking are amongst the skills commonly found within educational institutions (Baumgartner & Korhonen, 2010; Dawe et al., 2005; Fien & Wilson, 2009; Hopkins & McKeown, 2002; Ryan et al., 2010; S. Sterling, 2009; Strachan, 2009; I. Thomas, 2009; Tilbury & Wortman, 2004; Wals & Jickling, 2002). Thus, making the connections and interrelating these ways of thinking with a sense of care (as opposed to a set of values) can be crucial for the understanding and integration of sustainability. Therefore, broader understandings of sustainability alongside broader understandings of different approaches can lead to better integration into education. For some people, integrating sustainability into their teaching and practice may be about augmenting their understanding of sustainability. For others, it could be asking what
sustainability means to them and enabling them to see the vast array of connections already established in their own disciplines.

Consequently, this thesis is now a call, specifically to design teachers, design students and design practitioners, but also educators in general, that are attempting to include sustainability into their education and profession to celebrate their efforts and move beyond feelings of guilt. Many people in the sample groups, from students to experts, felt guilty over what they deem as ‘not doing enough’. As argued throughout this final chapter, there are only better and worse decisions in terms of sustainability; therefore, it is essential that designers rid themselves of the blame and remorse that can be so deeply entrenched within so-called sustainable visions. There are numerous global, national and local groups working towards a more sustainable world, despite not knowing what that might look like (I. Thomas, 2009). Moreover, moving past the limitations associated with single-issue ways of thinking is imperative in order to be able to address the complexities and interrelationships of sustainability.

In my opinion, these key findings are not just relevant for the discipline of design, but also for every discipline. Sustainability can be a frame of reference for every field and, as such, recognising sustainability as just good design or just good chemistry, economics, business or nursing etc. creates the concept of augmenting all disciplines towards better practice. In this way, increasing critical, reflective, creative and systems thinking, making connections, working collaboratively, understanding consequences and asking deeper questions of the true meaning of each subject can lead to adding value, a sense of care and building better relationships with communities of people. In other words, to improve the inclusion of sustainability into specific disciplines, recognition of what is ‘better practice’ in that sphere is the answer.
Appendix A:
Ethical Approval at Departmental Level of a Proposal Involving Human Participants (Category B)

NAME OF DEPARTMENT: Geography
TITLE OF PROJECT: Sustainable Design Education
PROJECTED START DATE OF PROJECT: 26th February 2007
STAFF MEMBER RESPONSIBLE FOR PROJECT: Dr. Michelle Thompson-Fawcett,
NAMES OF OTHER INVESTIGATORS OR INSTRUCTORS: Nicola Bould (PhD)

BRIEF DESCRIPTION OF THE PROJECT:

This research is being undertaken as part of a PhD in Sustainable Design Education. Environmental and societal issues have been gaining momentum in the public arena for approximately 40 years; does the pressure for change mean we have to change the way we teach design? Universities are key institutions to affect change. Design communities accustomed to tackling complex problems are also appropriate to take on such creative challenges.

This research is an exploration into the way design is currently taught within tertiary education, particularly the relationship between content and inspiration, teachers and students and what, how and why students learn what they do, especially with regard to sustainable design. I hope to build knowledge around ways to inspire design education to be able to adapt to tackling the most pertinent issues as design environments change. Sustainability is one such context that could benefit from new approaches to design and design education.

DETAILS OF ETHICAL ISSUES INVOLVED:

The ethical issues that may arise are participants will be observed and interviewed. The observations will include written notes being taken with regards to participant comments and actions. The interviews will be digitally recorded (voices only). However, participants will NOT be photographed NOR video recorded. Only their voices digitally recorded. Names and their associated institute or business will be recorded for the extent of the study. These details will be kept for the appropriate number of years before being destroyed.

ACTION TAKEN:

Approved by Head of Department Committee
Referred to University of Otago Human Ethics Committee
Referred to another Ethics Committee

Please specify: .............................................................

DATE OF CONSIDERATION: .................................

Signed (Head of Department): ..............................................
Information Sheet for Participants: March 2007

PhD in Sustainable Design Education

Researcher: Nicola Bould

Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate we thank you. If you decide not to take part there will be no disadvantage to you of any kind and we thank you for considering our request.

What is the aim of the project?

This research is being undertaken as part of a PhD in Sustainable Design Education. Environmental and societal issues have been gaining momentum in the public arena for approximately 40 years; does the pressure for change mean we have to change the way we teach design? Universities are key institutions to affect change. Design communities accustomed to tackling complex problems are also appropriate to take on such creative challenges.

This research is an exploration into the way design is currently taught within tertiary education, particularly the relationship between content and inspiration, teachers and students and what, how and why students learn what they do, especially with regard to sustainable design. I hope to build knowledge around ways to inspire design education to be able to adapt to tackling the most pertinent issues as design environments change. Sustainability is one such context that could benefit from new approaches to design and design education.

Currently case studies are being sought. These case studies are institutions or companies that focus on design and can be studied in-depth. The intention is to better understand individual’s knowledge of design, sustainability and sustainable design in relation to design education.

What types of participants are being sought?

The types of participants being sought are “designers,” these people are defined as those studying, teaching or working in a design institute or design business.

What will participants be asked to do?

Should you agree to take part in this project, you will be asked to answer a series of questions regarding design, sustainability and sustainable design. Each interview will be recorded and may take between 10 mins to one hour depending on each person.

Please be aware that you may decide not to take part in the project without any disadvantage to yourself of any kind.

Can participants change their mind and withdraw from the project?

You may withdraw from participation in the project at any time and without any disadvantage to yourself of any kind.

What data or information will be collected and what use will be made of it?

Personal opinions from students, staff members or business employees will be gathered and used to assist the researcher to understand the relationship of sustainable design and design education.

This information is being collected and used as research towards a PhD thesis. Transcribers, fellow researchers and supervisors may use this information.
The results of the project may be published and will be available in the library but every attempt will be made to preserve individual’s anonymity and that of the company or institute the individual works for. This includes actual names being replaced with pseudonyms or numbers or letters. Additionally names of cities, courses, names of products/services or furniture or any other identifying feature will be treated with the upmost priority of preserving anonymity and will be removed where necessary.

You are most welcome to request a copy of the results of the project should you wish.

The data collected will be securely stored in such a way that only those named below will be able to gain access to it. At the end of the project any personal information will be destroyed immediately except that, as required by the University’s research policy, any raw data on which the results of the project depend will be retained in secure storage for five years, after which it will be destroyed.

Reasonable precautions will be taken to protect and destroy data gathered by email. However, the security of electronically transmitted information cannot be guaranteed. Caution is advised in the electronic transmission of sensitive material.

What if Participants have any Questions?

If you have any questions about our project, either now or in the future, please feel free to contact either:

Nicola Bould or Dr. Michelle Thompson-Fawcett
nicola@design.otago.ac.nz or mtf@geography.otago.ac.nz
00 64 3 472 8947 or 00 64 3 479 8762

Te Ihowhenua / Department of Geography
Te Whare Wananga o Otago / University of Otago
Otepoti / Dunedin

This project has been reviewed and approved by the Department of Geography at the University of Otago.

Note: This project involves an open-questioning technique where the precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops. Consequently, although the University of Otago Human Ethics Committee is aware of the general areas to be explored in the interview, the Committee has not been able to review the precise questions to be used.

In the event that the line of questioning does develop in such a way that you feel hesitant or uncomfortable you are reminded of your right to decline to answer any particular question(s) and also that you may withdraw from the project at any stage without any disadvantage to yourself of any kind.
Consent Form for Participants: March 2007

PhD in Sustainable Design Education

Researcher: Nicola Bould

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:

1. My participation in the project is entirely voluntary;
2. I am free to withdraw from the project at any time without any disadvantage;
3. if I am a student, participating in this interview will NOT have any effect on my grades;
4. "this project involves an open-questioning technique where the precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops and that in the event that the line of questioning develops in such a way that I feel hesitant or uncomfortable I may decline to answer any particular question(s) and/or may withdraw from the project without any disadvantage of any kind."
5. the results of the project may be published and available in the library but every attempt will be made to preserve my anonymity.
6. I understand that reasonable precautions have been taken to protect data transmitted by email but that the security of the information cannot be guaranteed.

I agree to take part in this project.

(Signature of participant):

(Date):

(Name):

This project has been reviewed and approved by the Department of Geography at the University of Otago.
Consent form for Head of Department / Manager of Department: March 2007

PhD in Sustainable Design Education

Researcher: Nicola Bould

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:

7. My participation in the project is entirely voluntary;
8. I am free to withdraw from the project at any time without any disadvantage;
9. if I am a student, participating in this interview will NOT have any effect on my grades;
10. "this project involves an open-questioning technique where the precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops and that in the event that the line of questioning develops in such a way that I feel hesitant or uncomfortable I may decline to answer any particular question(s) and/or may withdraw from the project without any disadvantage of any kind."
11. the results of the project may be published and available in the library but every attempt will be made to preserve my anonymity.
12. I understand that reasonable precautions have been taken to protect data transmitted by email but that the security of the information cannot be guaranteed.

I agree that ................................................................. takes part in this project.

(University department or Business)

(Signature of participant):

(Date):

(Name):

This project has been reviewed and approved by the Department of Geography at the University of Otago.
Appendix B: Example of the Interview Schedule

Introduction:

I have chosen to approach you because of your involvement within design. Although most of my questions are mapped out, your answers to particular questions may suggest others that will help me to better understand your position.

Introductory Question:

• What is your main area of work? (the subject)
• How do you go about that? (average day, main responsibilities, etc)
• Why are you involved in this area? (reasoning – most efficient, affective, beneficial for company, etc)
• How long have you worked here?
• Where were you educated?

Key Questions:

1. I want to talk about design.
   a. What does design mean to you?
   b. How do you do that? How do you approach that?
   c. Why are you involved in this? (your reasoning why you do such things)

1. We’ve talked about design I am also interested in sustainability.
   a. Personally, what does sustainability mean to you?
   b. How are you going about that personally? (your personal endeavours)
   c. Why are you or are you not doing this? (why are you making or not making these efforts?)

2. We’ve talked about design and sustainability let’s talk about sustainable design.
   a. Personally, what does sustainable design mean to you?
   b. How would you achieve it?
   c. Why would you do this?

3. Personally do you believe that your institution is achieving sustainable design in design education?
   YES:
   a. How do you believe they are achieving this?
   b. Why do you believe they are doing this?
   c. Can you identify other opportunities that might exist to assist other institutes in this area?

   NO:
   d. In your opinion, how are they not doing this?
   e. In your opinion, why are they not doing this?
   f. Can you identify barriers that might exist that might be hindering this type of education?
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