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 hypothesises 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 indispensible 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 (Bergeå et al., 2006; Dewberry & Sherwin, 2002), collaboration (Boks & Diehl, 2006; Rothstein, 2002; Tischner, 2006) and citizens as co-designers (Bergeå 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

8.40. 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

Elements:	**Relating to Sustainability, Design or Education**
Critical thinking and reflective practice	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
Creative thinking	A way of developing solutions through original ideas and concepts
Systems thinking	The ability to recognize the bigger picture and analyse and make connections between flows and processes
Appreciating consequences	An understanding that actions taken may have wide-reaching effects (for instance, may cross boundaries between time or place)
Making connections	Having an understanding of the interconnected relationships between people, actions and environments
Collaborating	Having an ability to work with other people
Building communities	An ability to establish relationships and interact with 'affected parties' such as with people, objects, services, and environments
Conduct	An understanding of a responsibility to make change and the skills (technical and social) to contribute
Contribute	A sense of wanting to be involved in making change and having ability to ask deeper questions
A sense of care	A sense of fair play for others (including all people and the environment)

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, C*onduct*, *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

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 co 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.