All Together and at Once the Practice: Towards a Pedagogy of Implication for Australian Industrial Design

A dissertation submitted in fulfilment of the requirements for the degree of Doctor of Philosophy

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December, 2015
**Declaration**

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the dissertation is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

Liam Gwyn Fennessy

19th June, 2016
All Together and at Once the Practice:
Towards a Pedagogy of Implication for
Australian Industrial Design

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This dissertation is submitted for the degree of Doctor of Philosophy
12/28/15
For Dad.
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Liam Fennessy
December 2015
Abstract

All Together and at Once the Practice: Towards a Pedagogy of Implication for Australian Industrial Design

Concerning modes of pedagogy, this research investigates the incidence of complex design studio projects that manifest a ‘program’ that contains Sociotranseunt Practice – a theory towards a “pedagogy of implication”. A theorising through, and for the teaching of industrial design, it provides an account of how concerns for a changing disciplinary condition can be approached pedagogically: where design and education are all together and at once the practice.

Industrial design in the contemporary Australian context confronts major change. Changing socio-technical practices produce complex problems in the ways people live with designed things and systems. Issues of sustainability, and the agency of design in de-industrializing local economy are transfiguring normative meanings and modes of practice. The capacity for industrial design practice to mediate the implications of delivering change, manifest in people’s social and technical practices, towards a future state of sustainment and is necessarily a problem of pedagogy.
Undertaken in my capacity as a practitioner researcher, the research provides an account of industrial design educational practice in the contemporary Australian context. It uses the following methods: reviews of literature to build a detailed picture of the development of industrial design through education; case studies of instances of teaching as reflective fieldwork; and, the abstraction of the practice as a means of theory construction. The research forms as a narrative of changing disciplinary and educational drivers and ideals as experienced in teaching, and explicated through reflections on practice. It confronts the collision of current disciplinary concerns with historical disciplinary tendencies to articulate a process of (and for) pedagogy in the contemporary Australian context: to activate in teaching, to problematize, and reflect on a hybridised practice of designing as education, and education for and within design.

The research explores how pedagogic practices might be theorised in order to activate opportunities for the construction of new meanings of design practice to operate in within changing disciplinary conditions. Abstractions of the researcher’s pedagogic approaches, in the form of diagrammatic models and tools, constitute a key element of the research; acts of design - that move from the mind, out through practice and to the proposition of Sociotranseunt Practice. It builds a theoretical proposition for industrial design practice-pedagogy, and new strategies to enable through design: the mediation of social and technical practices towards sustainability and critical citizenry; and, the transformation of industrial design towards a critical practice - to attend to the
implications of its own practices.

A pedagogic and design practice theory, Sociotranseunt Practice repositions the industrial designer to operate through a socially activated and transitive practice, where the designer is a critical mediatory agent within socially defined contexts of concern, and the design of new things and systems cross into and transform the manifested implications of sociotechnical practices. Redrawing the contexts of work for industrial design, Sociotranseunt Practice alters the very doing of design. Problem solving gets recast as an activity of implication mediation, and design activity is rendered a transformative and interloping actor, thereby elevating, in a context of application, new responsibilities for design. The act of designing becomes a ‘thing-ing’, and a ‘system-ing’ and the designer is visibly, and inextricably implicated in the mediation of socio-technical practices.
Acknowledgements

This study took place alongside the other things I work at and for. As such its contents do perhaps not readily convey what has occurred alongside its production. Yet these things – the people and things not spoken of - have been critical to the concerns of industrial design and education it focuses on. Through the doctoral process I have become increasingly conscious of the significance of my "along-siders" in the stories of practice that the work attempts to tell. We are - all of us - after all produced by, and co-producers of the places and the concerns we work to be situated within, and by the generosity of those we love, live and work with.

I would like to express my gratitude to Associate Professor Dr. Soumitri Varadarajan, my supervisor, colleague and collaborator, for his continual support and critical eye through out the research journey. I started this research as an industrial designer who had discovered sociology and educational theory - a young teacher. I saw the opportunity for the development of a new and significantly open criticality of industrial design practice through education and approached teaching as I might a complex and stakeholder engaged design scenario: where teaching and designing and theory might be seen as the same. A means by which I could perhaps reconcile my own concerns of where in the post-industrial condition industrial design might go. I am now not so young, but through the process I have become much more of an idealist than perhaps I ever was. Soumitri’s care and assistance and his own love of teaching and theory have been a great inspiration.

I would like to thank the broader community of the Industrial Design program at RMIT University in which I work and that this research was located
within. To my academic colleagues, and especially to those that I have collaborated with through teaching, projects and writing, and those that have listened to my inquiry and provided guidance I am deeply grateful. To Dr. Scott Mayson for his particular support toward the end I am deeply indebted. To my many students for their skilled hands and thoughtfulness and unnerving capacity to make being thoughtful look easy, I thank you. Combined these relationships have presented me access to an open dialogue on the purpose, value and joy of teaching for practice in the domain of industrial design.

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Introduction

Concerning modes of pedagogy, this research investigates the incidence of complex design studio projects that manifest a ‘program’ of practitioner-research – of teaching and thinking. The research explores how pedagogic practices might be theorised in order to activate opportunities for the construction of new meanings of design practice. Abstracted through diagrammatic models and tools it builds a theoretical proposition for industrial design practice-pedagogy within the contemporary Australian context. A narrative of changing disciplinary and educational drivers and ideals as experienced in teaching, it confronts the collision of current disciplinary concerns with historical disciplinary tendencies to articulate a particular process of (and for) pedagogy.

Born from educational imperatives in the mid-19th Century to progress the project of industrialization, the development of industrial design as discipline is inextricably tied to the ways in which it has transitioned through educational settings. Meanings of industrial design have evolved through a series of moments. From a focus on design for serially produced and machine made goods, to the modernization of crafts’, and then to a practice that was instrumental in the progression of consumerism. As the industrial and social concerns of design became more complex through technological change and mass manufacturing, the discipline became concerned with how its processes of invention and intervention could be made more systematic in approach and systemic in outlook. In its contemporary guise industrial design is all of these things, and meanings of practice are translated through the designing products and services, that mediate concerns within socio-technical practices.

Carried through tacitly acquired pedagogic tendencies these meanings
of industrial design are layered one on the other inside education. Industrial design practice can thus be seen as defined by a palimpsest of its educational iterations, transmitted through the ideals and concerns of disciplinary education in the form of strategies for learning by designing. Practice, in this way is perhaps always and already pedagogical for design disciplines, and the ascribing of meanings of (and for) Industrial Design constitutes a particular form of design and educational thinking. However, where the reification of disciplinary meanings is central to pedagogic performance, the adaptability of the discipline to contend with its own implications, and to deliver change to our socio-technical landscapes through design is constrained.

Industrial design in the contemporary Australian context confronts major change raising questions of the future capacity of the discipline to deliver change through design. As an inherently applied discipline, emergent concerns for the particular agency of design necessarily enter the pedagogic exchange, and are central to the research.

Industrial design within the de-industrializing local economy and its changing manufacturing landscape is increasingly challenged. Pushed in part by the globalization of product manufacture and distribution, and hyper-industrialization of neighbouring Asian economies new definitions of practice are needed. The local context therefore demands a transfiguring of normative meanings and modes of practice, while becoming significantly global in its outlook. The outcomes of industrial design practice manifest in peoples social and technical practices. However, changing socio-technical practices produce complex problems in the ways people live with designed things and systems. Concerns of health, of living well, of exchange and mobility necessitate the inclusion of new methods and new discourses to mediate the implications of delivering change. Acting on concerns of sustainability and the impacts of
climate change requires a deep questioning of the environmental implications of the ‘things’ industrial design delivers into the world. The production and use of designed things and systems impact on a collective disciplinary capacity towards realizing a future state of sustainment. Approaching this requires new strategies for activating ideals, and a critical agency in practice.

These externalities present new opportunities for a transformation of the ways industrial design is done, and the contexts into which designed outcomes function. However, the transformation of a discipline is a process of making, and for industrial design this has historically happened through its pedagogic constructs and through its institutions. To induce a transformation of the discipline from within education the drivers, pedagogic conventions and orthodoxies of practice need explication. Yet just how a pedagogy that is so conflated with practice might be theorized, altered and activated to bring such a transformation presents the design educator with a particular field for thinking: each and all necessarily questions of pedagogy.

A critical and transformative pedagogy that invites change requires new tools, new strategies and a theoretical framework to recast industrial design practice towards a particular mode of critical citizenry: recast from an affiliate of the producer, and into to the contexts, concerns and socio-technical practices in which the implications of change collide. The research builds a pedagogic and design practice theory, Sociotranseunt Practice, that repositions the industrial designer to operate as a critical mediatory agent within socially defined contexts of concern; where, the design of new things and systems cross into and transform the manifested implications of sociotechnical practices. Redrawing the contexts of work for industrial design, Sociotranseunt Practice alters the very doing of design. Problem solving gets recast as an activity of implication mediation, and design activity is rendered
a transformative and interloping actor, thereby elevating in a context of application new responsibilities for design and the designer as inextricably implicated in the mediation of socio-technical practices.

These concerns for practice provide an abstract background, and produce for the research three central questions as to how pedagogic practice might be theorized:

- How are new (and old) meanings of practice translated through education, and what strategies might be deployed to discover and activate opportunities for the construction of new meanings of practice?
- What theoretical framework, methods and strategies might be required to recast industrial design practice towards a critical and transformative practice, so that it can attend to the implications of its own practices?
- How might the educator induce a transformation of the discipline from within education?

However, while these concerns are critical to the pedagogic practice that the research addresses, the central question taken to the research is how, over nearly a decade of practitioner-research, does the research afford the realisation of a pedagogy of implication: where design and education are all together and at once the practice?

**Method of Approach**

Bridging modes of enquiry from education, critical theory and design to activate in teaching, reflect on, problematize and theorize a hybridized practice of designing as education and education for and within design. The Industrial Design Program at RMIT University in which the research was undertaken provides significant scope for experimentation in the delivery of project-based learning. However, attentive to the ethical and practical parameters of
the context of the research a decision was taken early to focus it only on the experience of the educator, as this is in itself a site of inquiry that is increasingly lost in contemporary scholarship of learning and teaching. As such there are no direct references to students individual activities and evaluations of the qualities of the teaching and learning are set to the side.

The design studio culture that the fieldwork of this research was undertaken in has as series of dimensions. A four-year undergraduate degree, Industrial Design at RMIT University positions the design studio as a site in which industry and community relationships are fostered and maintained. Studios are locations for the integration of student learning with the design research activities of the academic faculty. These studios have a series of underpinning agendas for practice that include: socially oriented design; new product and service innovation; sustainability; contemporary craft design; design for health; and, design for tangible interactions. With a cohort of between 16 and 20 students, design studios are generally facilitated through industry partnering and serve as a way of introducing students to the variance of industrial design in the professional domain. In this context each studio is framed as a unique enterprise, with its own methodological orientations and design output requirements, but with defined expectations for learning outcomes that are common across all unique studio offerings.

This context afforded high degrees of experimentation with different pedagogic strategies. Industrial design practice and education are often highly collaborative. Many of the instances of teaching undertaken were done so in collaborative ways with peers (see appendix. 1) where each educator brings different expertise, and as opportunities for research, industry engagement and community outreach. Through these collaborations the research produced a number of published articles (see appendix. 2). Undertaken in a largely
creative practice based mode, where different projects were conducted and reflected on, this approach provided a setting for explorations in areas of pedagogy, design history, sociology of technology and design theory.

In this way the research presents a particular narrative of integrated scholarship in research and teaching in the field of industrial design education. Undertaken through a framework of concurrent and contingent research activities: reviews of literature to build a detailed picture of the development of industrial design through education; case studies of instances of teaching as reflective fieldwork; and, the abstraction of the practice as a means of theory construction in practice. These methodological phases iteratively progressed the research and intersected throughout the process of research. While the thesis gives a sequence to these phases in the approach the sequence was in reality cyclic, with various periods of intensity and return in each.

Reviews of Literature

In coming to appreciate the industrial design as a discipline the history of its development through formal education is key. The research involved undertaking a comprehensive literature review that surveys the development of industrial design education through its pivotal phases and changes from the mid 19th century to the close of the 20th century. Primarily contained in two dedicated chapters that focus on history this approach to literature crosses into the other aspects of the research. The approach to the literature review taken is discursive and seeks to weave a critical account of the development of pedagogic concepts and their enmeshment with disciplinary meanings, methods and theory. The tracing of industrial design education through literature crosses through various fields of history, and into historical records to build a particular historiography of industrial design in the educational
Teaching as Fieldwork and Reflective Practice

The pedagogic inquiry, undertaken through teaching undergraduate industrial design student at RMIT University, used teaching as site for reflective practice and action research. This carries with it a range of affordances and limitations and as a tenured academic with in the program I was teaching I was acutely conscious of the many boundaries that research in such a setting must adhere to. Using a variety of methods to situate and build a theory of my own pedagogic activities as the site of inquiry, the fieldwork is presented as a collected body of qualitative, and often collaborative case studies (Jarvis, 1999). These case studies in the dissertation convey a series of selected design studio and other course engagements as specific projects for testing some of the propositions of the research, and through the research there are many other engagements in teaching that are not described but contribute to the thinking. Each case study frames design and pedagogy as a set of operations concerned with the negotiation of capability development for practice and the articulation of those capabilities into specific contexts. The components of these engagements include the description of various strategies and models for staging industrial design education developed through (and for) teaching.

The approach to practitioner-research in teaching undertaken has at its core an agenda for the improvement of practice, and the institutions into which the practice takes place (Biggs, 2001). The research thus attempts to make the integrated, interdisciplinary and propositional nature of industrial design
education less opaque through practitioner-research. Approaches to reflective practice and action research span both the design and educational domains and the research process uses an amalgam of methods from both spheres. The account of the fieldwork offers with what social scientists might call a “thick description”, of what it may mean to teach through designing, of how industrial design might be reconfigured through a critical approach to education for practice, and how new meanings for design through pedagogy might be discovered.

**Modeling & Theory Construction**

Experimentation, the various elements of teaching, reflective practice, and theory construction are facilitated throughout the research by a process of diagramming. This phase of the research involves the ‘practice’ being abstracted and redefined and was deployed in almost all phases of the fieldwork; from curricula design, to the development of explanatory tools, to think through the findings and to plan future actions. Forming as a series of models that focus on the temporal and experiential nature of learning by designing, and of designing as learning, in order to extend and refine for application within the context of industrial design education. As a process integrally tied to design, this modeling or diagramming is a means toward theory construction. The theory constructions presented are in themselves both declarative and descriptive of the particular pedagogy that is revealed and its underlying concerns.

The theory construction, and models conveyed draw on a series of methods shared by both educational theory, sociology and design practice. Theory construction for research in design enables tacitly acquired practices to be pulled apart and ultimately transformed (Friedman, 2003). For fields of
critical theory research for education, theory building is a means towards transformative and emancipatory learning that comes from and back into the context of research as praxis (Lather, 1986; Kincheloe & McLaren, 2002). The activities of theorizing undertaken re-configure the reflective accounts of the design-teaching scenarios and explore various strategies to expand and refine them as theoretical propositions. The theorizing ultimately leads to the proposition of a critical pedagogy (theory) for industrial design in the contemporary Australian condition.

Chapter Summaries

The textual account of the research is structured around two primary domains of activity. The first domain, made up of two chapters offers a historical tracing of key moments in the development of industrial design as a discipline through education. This historiographical work forms as a discursive literature review that connects together the origins, developments and ruptures of pedagogy in industrial design and its transmission and adaptation to changing times and contexts. The second domain, crossing three chapters, present a series of case studies of the authors’ pedagogic practice through an account of industrial design education in the field and its changing disciplinary and educational drivers and ideals. Findings from the case studies offer a series of abstractions of the authors’ pedagogic approaches in the form of models and tools for curriculum design, for project-based learning and for the role of pedagogy as a mechanism of disciplinary adaptation discussed in the final chapter.
Chapter one: New Institutions for Learning and the Roots of Industrial Design Education

Chapter one traces the early developments of a prototypical discipline of industrial design through Industrial arts education in the 19th century. It explores the curricula strategies, and discourses that surrounded the progression of the field design. While concurrent shifts were happening in continental Europe, the chapter centers on 19th century British initiatives and the translation of models of design education throughout the English-speaking world, and specifically the interpretations and adaptations to local needs within North America and Australia. In mid 1800s and under the administration of the British Board of Trade a new model of publically funded Industrial arts education within a dedicated Government School of Design was initiated. Incorporating a scholarship reserved for students to train to be prototypical industrial designers, the initiative located the designer, as a new type of professional, between the aesthetic and utilitarian concerns of material culture and the parameters of serial and machine production. As a model of further education of working and middle classes, Industrial arts education rapidly developed. Focused initially on the role of design in reforming the quality of British goods design education moved from being an instrument for economic agendas to being a educational and material culture revolution.

The School of Design was rapidly transformed from an isolated initiative to a model of mass education for the working and middle classes and new Schools of Design were set up in industrial cities across Britain and were replicated through the British colonies and in North America. The transmission of a standard curriculum through a growing network of Schools of Design, led to the development of a particular pedagogy for design and for the decorative and industrial arts that interfaced in new ways with changing manufacturing and
social landscapes. The proliferation of design education saw the prototypical construction of industrial design as a new discipline move apace through the second half of the 19th century, as a connecting together of fine arts, artisanal practices and a new science of machine and serial production. In focusing on the pedagogic construction of industrial arts education and its transitions through the century the chapter exposes a series of underlying pedagogies traits, ideological drivers and points of tensions that were carried through at and design education and into industrial design as gradually codified as a discipline.

Chapter two: Disruption and Codification: The Professionalization of Industrial Design

New technically focussed institutions grew to attend to the increasingly complex processes and technologies used in manufacture at the start of the 20th century. This led to greater degrees of specialisation in Industrial arts education and with it new ideals and new methods for design gathered momentum. These ideals elevated notions of the designer as both craftsman and artist and took particular effect in Germany through the Bauhaus School of Design and in the United States. This saw the professions of design interact in a more intense way in the curricula constructs of design that had been formulated in the century prior and an education for designing that had privileged techniques was gradually supplanted by an education in design. Shifts in pedagogic approaches via methodological contributions from Germany and commercial discourses of design from the United States led to the development of modern industrial design education at RMIT University in Australia in the late 1940s.
Tensions of meanings of industrial design practice would play-out throughout the second half of the 20th century and would progress the discipline, its methods and its modes of education substantially. Tensions between notions of design as being a largely intuitive or art-based practice and the positivistic push for it to be a more systematic practice through the Ulm School of Design transfigured the professional practice of industrial design and its education. The intellectual discourses of industrial design generated through education through the century are discussed in relation to the development of industrial design education at RMIT University. The chapter concludes at the turn of the millennium with a refrain, where older notions of design and education collided with changing institutional parameters, new technologies and the realisation that industrial design education was perhaps no longer concerned with the intuitive nor the systematic. Instead industrial design education was coming to confront the systemic nature of the discipline.

Chapter three: Pedagogy as a Palimpsest: Exploring Models and Archetypes of Industrial Design Pedagogy

The development of industrial design education and its transitions through Schools of Design, to technical institutes and finally to universities generated a series of pedagogic elements. These elements have been tacitly carried and adapted to form a set of signature pedagogies. This chapter explores these conventions within the contemporary condition of industrial design education and abstracts them as a series of pedagogic concepts and models.

These concepts and models open out the role of subjects, themes and topics for industrial design education as materials for curriculum design that in turn define particular methods of teaching and learning. Cultural-Historical Activity Theory is used as a means of analysis of teaching in teaching and leads towards
the description of a typology for industrial design studio-based learning construction that revolves around different combinations of methodological and contextual concern and their structuring within fictitious or authentic learning immersions. The chapter closes by discussing the function of design teaching and its strategies and structures as a means of disciplinary adaptation and transformation.

Chapter four: Scales of Implication: Models for an Enlarged Narrative for Teaching, Learning and Designing

A pedagogy that attempts to progress new notions of practice requires ways of structuring learning that support both the capability development of students and the engagement in new fields for design. To interpret these pedagogic approaches this chapter commences with a framing of industrial design education through concepts and methods from Actor-Network-Theory (ANT). Socio-material theory offers industrial design education multiple points of addressing a given design problem at various scales. The work of encountering through design the complex interactions between people and technical-material things in a system serves in education a means by which systems might be altered and where opportunities for innovation or redirection might be found.

Two pedagogic models that deal with issues of disciplinary change and systemic concerns for design are described. The first model centers on the role of ‘the implication’ of design as a key pedagogic device in the construction of an enlarged narrative of industrial design practice. The second model offers a temporal structure for the development of and conduct within design projects in ways that privilege reflexivity in learning and designing. Discussed in relation to a case study of a series of design studio projects undertaken at
RMIT University in the area of design for diabetes and condition management these two models offer strategies for rupture in the ways ‘a design process’ might be deployed. The chapter then shifts the notion of the ‘implication’ through via reflective case study of teaching and supervision undertaken in the domain of social and sustainable design.

Chapter five: Looking for Rupture and Inviting Change: Levers of Pedagogic Transformation

Contemporary tensions of the role of industrial design in a de-industrialising society potentially leave long-formed notions of practice adrift. Where design moves between the systematic and the systemic in its negotiations of meanings for practice pedagogic practice require ways to enable it. These moves are often driven by design needing to confront major change – social, environmental or economic - that can rupture normative mode of practice. However for the design educator, looking for opportunities for disciplinary transformation within big themes of change carries necessary tensions.

This chapter discusses notions teaching for a changing landscape for industrial design practice in the Australian context. Using a set of reflective case studies, it presents a new opportunities for the negotiation of industrial design in education. Focussed on the need for local practice to be concerned with sustainability and it’s rapidly changing context of manufacture the chapter discusses new courses of action towards changed imperatives and a criticality in and of practice. A changed and changing future context of engagement for Australian industrial design is discussed, and the notion of the implication is unpacked and positioned as a mechanism for the construction of disciplinary meanings. It points toward the need for a critical agency of design
to contend with change an implication attuned disciplinary practice and therefore a pedagogic theory that might facilitate it.

Chapter Six: Towards a Pedagogy of Implication: The Sociotranseunt Practice

In reflecting on the fieldwork, this chapter builds a theoretical proposition for a particular kind of industrial design practice pedagogy. Contemporary theories of transformative design practice within social and sustainable design discourses position the agency of design in a dilemma where to bring positive change to the world design itself needs to change. The theory of the practice described in this chapter repositions industrial design to operate as a socially activated and transitive practice. Sociotranseunt Practice is a mediating breach between the methodological and ontological theorising of design for change. This practice sees the industrial designer intervene through the design of new things and systems that cross between implications and actors in a particular context to transform sociotechnical practices. The salient elements of Sociotranseunt Practice are described and discussed in relation to a pedagogic framework. An ecosystem, or actor network, this framework, where design activities and outputs mediate implications, is discussed toward the realisation of a pedagogy of implication.
1. New Institutions for Learning and the Roots of Industrial Design Education

The professionalization of design for the serial production of utilitarian and decorative objects is rooted in a mid-19th century British project of education and inextricably tied to politically driven industrial reform initiatives and strategies to increase national trade capacity (Burton, 1999). While similar shifts towards the development of design capability for serial manufacture were concurrently developing in other European centres, the British approach saw a break from artisanal and fine arts training traditions and formed as a new model of education within dedicated schools of art (Bell, 1963). This development of a new form of applied art education can be seen as a response to the confluence of a series of externalities, including social pressures to improve the impacts and implications of rapidly industrialising cities, national competitiveness in the quality, production and export of products, and the growth of urban and increasingly middle-class populations in emerging nations and British colonies.

Built around an augmentation of established models of fine arts and crafts training, education within schools of design invited new techniques and discourses into an education that located the designer as an intermediary between aesthetics and production. With the creation of new educational institutions, a particular pedagogy for design developed that interfaced in entirely new ways with a rapidly changing manufacturing landscape to ultimately transform popular notions of material culture and the utility of objects. This saw the prototypical construction of industrial design as a new discipline through the connecting together of fine arts, artisanal practices and a new science of machine and serial production. A process of learning that
borrowed elements from other fields, and from earlier forms, this new concept of formal education was, through its curricula and institutional models, significantly systematised and expanded throughout the second half of the 19th century (Burton, 1999).

This chapter traces the early development of industrial design through education, through its curriculums, institutional moments, and through the pedagogic strategies that enabled it to grow as a field of creative and technical practice. It centres on the influence of British initiatives and the translation of these models into the English-speaking world of the 19th century as a way to foreground the construction of industrial design and arts in industry education that developed in Australia, and to expose underlying pedagogical traits, cues and tensions that have been carried through industrial design from then until now. Invariably this chapter leaves out much more than it contains, but nonetheless emphasises the critical shifts in the development of industrial design as a discipline through formal education in ways that most directly influenced the Australian design condition.
1.1 Industrial Design Education as a Government Intervention

The origins of industrial design curricula can be traced to the 1830s and the initial work done in England to establish what would later be known as the South Kensington system (Shepard, 1975). The first wave of industrialization had fundamentally transformed the British economy, and with increased mechanization for serial production emerged a particular approach to the division and structuring of factory labour and the types of new expertise needed to specify how goods were to be produced. In the first half of the 19th century the growth of urban populations in British cities, former colonies and emerging nations was inextricably tied to new forms of serial manufacture and the export and consumption of material goods. The pressures of this fundamental economic transformation preoccupied much of the politics of the day and were the subject of a long-running process of British macro-economic and labour condition reforms called the Factory Acts (ibid, p.4). Maintaining the quality and export competitiveness of manufactured goods and managing the social implications produced by such a seismic shift towards being a manufacturing economy was critically important for the polity of the time.

High-quality serial goods manufacture, such as those of the much-lauded Wedgwood Company (Raizman, 2003), were largely attributed to the effective marriage of decorative design with new processes in serial manufacture and provided a template for the British to use in shaping their broader systems of industrial production. However, in the late 18th century and the first half of the 19th century, enterprises like Wedgwood were not the norm, and occupied a particular place as scaled-up artisanal practices. Factories that produced all manner of products for all sorts of consumer markets developed rapidly, and
often in the absence of expertise that could inform the quality of the goods made. The export of manufactured goods had become a mainstay of the British economy, as they were with most advanced economies, and a concern that the standards of industrially produced goods in Britain were slipping behind those of continental Europe gathered momentum in political and industrial circles (Romans, 2007). The transference of artisanal capabilities into enterprises of serial production was seen as a way to build quality through design, to leverage new industrial production techniques, and ultimately to build the export competitiveness of material goods. It was, however, practically and politically problematic to elevate the artisanal inside a rapidly changing industrial sector. Previous interventions to accelerate a shift toward industrialization had been unpopular, and particularly those reforms directed at disrupting the long-held control of guilds that had for many years controlled both the training of artisans in various fields and the supply of an artisanal workforce (Burton, 1999).

Existing models of education in Britain that might have been converted or systematised into something that resembled a national strategy of technical education towards these aims were diffuse both structurally, politically and in the value associated with an education in design as an economic imperative. Adult technical education in relevant fields included the training of draftsmen and machinists through popular community-based programs within local Mechanics Institutes; small, private and industry specialist “society schools of design”; apprenticeship models in the craft traditions and the guilds; and fine arts training in various Academies of Art (Macdonald, 2004). This ecosystem of education that might have been leveraged for an improvement in education in design for manufacturing was highly dispersed and therefore difficult to influence in view of broader national agendas.
It was, however, the growth of state-funded manufactories in continental Europe that compounded the need for significant educational reform in Britain. These manufactories, which had previously serviced the craft needs of the cultural and political elite in France, Bavaria and Prussia were being successfully transformed into both vocational training providers and producers of tradable goods into the general market. Built upon their atelier training traditions, these emergent models of technical education sought to directly develop capabilities in arts, crafts and design for industrial manufacture. European Schools such as the Ecole des Arts Décoratifs, founded in Paris in 1762 and affiliated to the craft collections of the Conservatoire des Arts et Métiers, the Kunstgewerbeschule in Berlin and the Munich Academy were, by the first half of the 19th century, each in their own ways formalizing prototypes of design, or arts for industry, education (Macdonald, 2004; Dutta, 2007). Britain, as the global powerhouse of industrial production of the time, required a new strategy to build national capacity in design for manufacture and to respond to the shifts that were occurring in continental Europe.
1.1.1 A Liberal Proposition

In July of 1835 British Parliamentarian William Ewart motioned in the House of Commons:

That a Select Committee be appointed to inquire into the best means of extending a knowledge of the Fine Arts, and of the Principles of Design among the people — especially among the manufacturing population of the country; and also, to inquire into the constitution of the Royal Academy, and the effects produced by it.

The motion was passed and the Select Committee of Arts and Manufactures, as it was titled, conducted an enquiry focused (Burton, 1999) on the question of the quality of British industrially produced goods, the national design capacity to improve the competitiveness of manufactured items, and the ways in which established models of Fine and Industrial Arts training could contribute to a national educational agenda.

The broad remit of the Select Committee included the investigation of the charter of existing institutions, including the entrenched and elite Royal Academy of Art. The financial workings and governance of the Royal Academy of Art were of particular interest to Ewart, who along with other parliamentarians had been lobbied on the subject by industrialists and notable artists. As a liberal (then considered radical), Ewart frequently tackled the elitism of British institutions through motions and replies in parliament. He had a strong interest in the advancement of the working classes and the role of the legislature as a mechanism toward civil society. This orientation toward the role of government in the betterment of all citizens, through increased
accessibility to education and the development of truly public institutions of further learning, would later see William Ewart as instrumental in the introduction of key reforms including the Museums Act of 1845 and the provision of universal access to libraries through the Public Libraries Act of 1850 (ibid, p.16). Thus the political push for ways of influencing the qualities of designed and serially manufactured goods as an economic imperative brought with it a series of concurrent agendas for social reform that would remain as discourses within design education and significantly influence the development of disciplinary meanings for industrial design. However, Ewart’s early influence on the progression of these agendas or ideals for a new form of arts practice that could influence the everyday lives of all people has been obscured by both the tensions and astounding successes of the model of further education in design that would be developed out of them.
1.2 A New School of Design

Under William Ewart, the Select Committee for Arts and Manufactures devised a bold plan to deal with ways of strengthening British manufacturing through dedicated education in design. Distinct from the fine arts training that the Royal Academy and other established art schools were concerned with, the Select Committee proposed (Romans, 2007) the need for what was touted as an entirely new system of technical and practical arts education that interfaced directly with manufacturing industries. Such a model drew on the best aspects of craft and artisanal training, fine arts training and new discourses from technical education. Ewart convinced the treasury to fund a scheme of stipend-type scholarships for students, the hiring of experienced teachers, and the establishment of a new Government School of Design that was to be administered by the Board of Trade (Burton, 1999).

After a relatively short period of planning in 1837, the Government School of Design (or Normal School as it was sometimes called) was commenced in earnest in London under the temporary directorship of architect J.B. Papworth (ibid. p19). The Government School of Design took up premises vacated by the Royal Academy in Somerset House in South Kensington. Students of the school were funded to study to become prototypical industrial designers through a form of government scholarship or stipend and were referred to as National Scholars. Many of the students that entered this new program of ‘arts for industry’ education came with prior training as painters or as decorative artists and modellers inside the manufacturing domain, and their education was focused on the extension of pre-existing capabilities and the uptake of new techniques for furthering the possibilities of serial production (Macdonald, 2004). The provision of a full scholarship for study towards design for
industrial applications was particularly important, as it allowed students that otherwise would not be able to further their education a means of support, just as it ascribed a significance to the value of such an education towards national priorities.

A newly formed Council of the Government School of Design appointed renowned painter William Dyce as the first Superintendent of the school (Pointon, 1979). Prior to his commencement the council sent Dyce on a benchmarking tour of European schools of art and manufacture and to acquire for the new school specimens and models that would be used in its teaching (Burton, 1999). Dyce came with significant and directly transferable experience in the translation of fine arts techniques to industrial production; he was previously Head of the School of the Honourable Board of Trustees for the Encouragement of Manufactures of Edinburgh. The Trustees Drawing Academy of Scotland (or Trustees School, as it was often called) was one of only a few existing schools that corresponded to the vision set out by the Select Committee and supported by the Board of Trade. Established in 1760 (Macdonald, 2004), nearly 80 years earlier than the Government School, the Trustees School had a strong reputation for teaching that sought to improve the capability of Scottish industry, and as such was one of a only few in the British Empire that contained the level of expertise in arts and manufacturing that was required.

The other notable school at the time was the Drawing School of the Royal Dublin Society in Ireland (Turpin, 1982). Initially founded in 1731 as the Dublin Society(1) for improving Husbandry, Manufactures, and other Useful Arts, through its model of education and through its networks into Irish industries it looked to develop agriculture, arts, industry and science

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1. Like the Trustees School in Edinburgh, the Royal Dublin Society's school was incorporated under the South Kensington system in 1854, and is now the National College of Art and Design and affiliated with University College Dublin.
as economic imperatives. With the addition of a natural history museum in 1815, the Dublin Society flourished. In 1820 the Dublin Society was awarded Royal designation through the patronage of King George IV (Meenan, & Clarke, 1981), and it continued to build a reputation for its industrial and fine arts training. The facilities for drawing instruction that the Royal Dublin Society offered had been acquired through the gradual annexing in 1744 of the services of an existing private drawing school that had been set up in the 1730s and run by renowned Irish artist and draughtsman Robert West (Turpin, 1989). In 1757 the Society established its own drawing school and took West on as Master, a position that he would retain through a protracted period of ill health until his death in 1770 (Turpin, 1986). By the early 1800s the long-established drawing programs at the Dublin School were divided into four distinct domains of technical instruction for design: architectural drawing, landscape and ornamental drawing, figure drawing and modelling (Turpin, 1982).

Dyce was tasked with the development (Macdonald, 2004) of a prototypical curriculum that could both train for design capabilities inside a manufacturing context and for the development of design teachers who could expand the mandate of the Board of Trade through the establishment of sister schools in other manufacturing cities. Dyce, like many British artists of the time, was deeply informed by the German Nazarene School of painters (ibid, Pp. 80-82). A precursor to the English Pre-Raphaelites, the interpretation of Nazarene ideals that Dyce brought revolved around the role of the arts as means of moral public education and elevation. Under the direction of Dyce from 1838 to 1843, the Government School of Design conveyed these Nazarene ideals (Sheppard, 1975) through teaching a near neo-medievalist attitude to notions of the 'workshop' as a mechanism for instilling 'truthfulness' to
craftsmanship, and the transmission of a rhetoric of craftsmanship into the
design of industrialized and serially produced goods. These ideals of the
‘workshop’ as a location for very grounded and practical thinking would grow
with the development of industrial design. Indeed the ‘workshop’ as a place
for reconciling craft traditions and values with a changing technical discourse
of manufacture constituted a key conceptual and pedagogic negotiation that
would have a profound impact on the professionalization of design through
the ways it structured relationships between the arts and sciences, state
institutions and industrialists throughout the 19th century.

The Trustees School that Dyce previously ran would no doubt have provided
a useful template for how the Government School of Design, or network of
schools as it would soon become, might best function. While not prominent
in much of the narrative around the first decade of the Government School of
Design initiative, the Royal Dublin Society School would later be recognized
as the ‘parent’ of the entire South Kensington Schools movement by Henry
Cole in a published address titled ‘The Functions of the Science and Art
Department’ in 1857. The model of technical arts education entwined with
industry provided by these template schools and Dyce’s interpretations of
German concepts of art and craft gave the new Government School of Design
a conceptual and pedagogic framework for the development of an entirely
new discipline. As the remit and capacity of the Government School of Design
became more visible through its first few years of operation, an underlying but
ultimately highly productive curricular tension evolved.
1.3 Proliferation and Paucity: Emerging Tensions in a New Design Education

The parliamentarians who pushed for and oversaw the development of the Government School of Design were not simply acting out of concern for the renewal of an aesthetic of the time. Britain had been the centre of the world’s industrial production for some time, but its competitors in continental Europe were catching up and in some instances overtaking British standards of efficiency and quality of both product and processes of manufacture (Bell, 1963). Similarly, the demand for material goods from the rapidly growing urban societies of the empire’s larger colonies, and particularly from North America, whose own industrial system was in its infancy, meant that those nations that had the industrial means had a largely open global market for their goods.

To cater to growing the demand for designers, regional Government Schools of Design were rapidly established across Great Britain in the decade that followed, including Manchester and York in 1842, Birmingham and Nottingham in 1843, and Glasgow in 1845 (Macdonald, 2004). With the addition of branch schools the model became a networked system of education and gradually became known as the South Kensington system. However, the issue of an inadequate supply of industrial design capability for manufacturers was mirrored by a paucity of suitable teachers of design. Ewart tabled a motion in parliament in July 1842 to formalize the establishment of a Central Normal School of Design to deliver specialist design teacher training to service the development of regional Schools of Design. Pivotal to the expansion of Schools of Design into other industrial cities was Ewart’s desire for a central site for funded design teacher training, and Hansard makes very clear the economic
and industrial reforms that were behind the initiative and the capacity constraints of delivering such a reform (Hansard, 14 July 1842). While the motion was withdrawn, the exchange between parliamentarians shows strong support for the need for building educational capacity in the art of design for manufacture, particularly in its regional industrial cities. Mr Labouchere, a former president of the Board of Trade, on the subject of the lack of availability of suitably qualified teachers or Masters of Arts of Manufacture, assured the committee that a ‘normal class’ (a teacher training class) had been established in the London Government School and would be monitored, and then went on to state that:

*Females were also educated for those departments of manufacture in which their labours were engaged, and he had no doubt that all the benefit that could be expected from an establishment of this description would ultimately be realised.*

The economic and technical capacity issues at play were broad and complex, and required quite progressive policy that brought into question deeply entrenched social norms. The Government School, like many Art Academies of the time, did not formally admit women to study alongside its male students, although it would open a dedicated female School of Design in London to sit alongside the main school shortly after (Chalmers, 1996). In raising the prospect of women as equivalent in training and expertise to male ‘masters’, or ‘scholars’ as those that undertook the full suite of educational stages, design education as a co-educational model appears part of the broad design reform agenda from as early as 1842. While progressive, the inclusion of women in this funded program over time became important for reasons other than
social reform. The growing popularity of the Female School set up by Dyce in 1843 (Sheppard, 1975) was used as a mechanism for fundraising (Macdonald 2004), useful in supporting the acquisition of samples for the growing collection and the studio and workshop facilities for the school, and no doubt it was also used as a way of building a broad public acceptance of the notions of 'national' value that such a novel, and expensive government initiative entailed.

Alongside the inclusion of women in formal education, and the deliberate training of teachers (or Masters as they were called) who would occupy positions in the growing national and colonial network of schools of design, the Government School of Design initiated other novel models, including the linking of emerging concepts of the museum to formal education. The British Schools of Design and the numerous schools that would emerge in colonial cities such as Melbourne throughout the 19th century frequently positioned the technical art of drawing within the sites of public collections of industrial arts as central to their curricular strategy. Thus many public museums became places for technical education, and importantly places that could collect and display to a curious public the artefacts of contemporary societies alongside antiquities. The museum in the curriculum served multiple purposes, both pedagogic and public. Artefacts provided a direct means by which deeper understandings form, material and manufacture could be imparted in practical and largely self-directed ways, and simultaneously a broader public appreciation of what was possible through new (and old) design and production techniques. Funded through government coffers, these collections of artefacts, specimens and models provided design education and practice with a means by which the very value of design could be publicly asserted
to industries that were still coming to appreciate its particular expertise. Critically, the museum functioned in education as a proxy for teaching, and ideas of design education formed at least in part as a process that significantly drew from material and technological precedents enquired into by the learner rather than through being directly taught. Indeed, this construction of an inter-relationship between public collections of arts, crafts, technology and science and design education as a significantly self-directed affair became a hallmark of the South Kensington system as it expanded throughout the second half of the century (Burton, 1999).

The pedagogic parameters set up by Dyce and his peers in the first years of the South Kensington movement offer a glimpse into the broader concerns of industrial arts or arts for industry education as a means towards commercial ends that is particularly profound. As Sheppard (1975) states:

To Dyce in particular, and to his tenure at the School of Design, South Kensington owed the importation from Germany of an educational theory that linked ‘design’ not to the academic ideal of the human figure but to the commercial requirements of craft processes. (p. 11)

The influence of German schools of thought, particularly concerning questions of utilitarianism, on the nature and purpose of design in modern societies are important in understanding the early development of design and technical education in Britain, and particularly the approaches to education that Dyce put in place. German educational models of the time saw the location of practical and technical education as sitting outside of the philosophical remit of universities and sought to connect teaching and learning directly to the industrial and technological requirements of specific
industries through apprenticeship or journeymen models of training. Key to an articulation of these ideas into formal education was providing teachers, as participants in industrial practice, with very high degrees of autonomy over the content that they saw fit to deliver, and for students to be able to demonstrate their capabilities through practice. These notions of teacher autonomy, and demonstrable ability across the totality of a student’s vocation would be short-lived, and as South Kensington styled schools were established throughout the British Isles to deliver a standardised curriculum they would be incrementally curtailed (Macdonald, 2004).
1.4 New Ideas for Design

Although the South Kensington schools were established with the explicit intention of using a technical arts education as a means of building industrial design capability directly into local manufacturing enterprises and to give the consuming public a desire for higher-quality goods, the negotiation of ideas of art, design and science meant that other issues for design inevitably crept in. Ideas of the value of craft and technique, and questions of the location within the ‘arts’ that a new professional designation of the ‘designer’ as a mediator between worker and industrialist, as arbiter of form and utility, and as agents for the reform of a changing material and technological culture ought be would emerge. These early ideas and tensions would inform models of industrial design education around the world for the next one and a half centuries, and the particular disciplinary struggle of trying to find a balance in the objectivity required of design as a science in the industrial context and the expressive and intuitive nature of design as a driver of the aesthetic concerns of the fine arts.

This struggle was not simply confined to the curriculum structure but permeated both the public commentary and administration of the School of Design. Prior to the recruitment of Dyce to the London School, the Board of Trade appointed a governing council of established artists and businessmen. The artists appointed were all members of the Royal Academy and would affect the ways the council would both govern and interpret the roles of ‘art’ as a technical education for a new generation of designers. Indeed this struggle, as Christopher Fraying’s (1987) history of the Royal College of Art refers to frequently, became a recurring theme for the London Government School of Design and its curriculum right through its reformulation as the National Art Training School in 1853 and eventual transition to the Royal College of Art in 1896.
After Dyce’s reign and the first few years of the British system of design education, the move to revive crafts’ educational traditions gained momentum. Seen as a way of intervening in the often socially problematic nature of industrial manufacturing processes, these ideas of the ways in which design might improve both the working conditions of the manufacturing workforce and the utility and aesthetic qualities of products designed would open a moral dimension alongside the technical that would significantly define the construction of meanings for the new vocational identity of the designer. These ideas would be later developed and championed by social critics such as John Ruskin and articulated through design practice by designers including William Morris (Schmiechen, 1990). The infrastructure set up as part of the South Kensington scheme served the development in students of new meanings of design in society well, but perhaps not as part of its formal curriculum. Its publicly accessible collections of arts and industry and its close associations with government, industry and the arts community provided a ripe environment for the development of new ideals; however, the formal system of education tended toward the instrumental, and maintained a focus on the acquisition of technical skills (rather than philosophical enquiry) that were seen as useful for the development of manufacturing industries. The early curriculum also contained omissions that appear quite deliberately intended (Macdonald, 2004) to help differentiate the type of training conducted at the School of Design from that of fine arts training, the most notable being the absence of figure drawing. The Schools of Design were, after all, for those who sought training to work within manufacturing enterprises and alongside the working classes, so positioning the mission of the school within a class debate assisted to both communicate its value to a working- and middle-class public and differentiate the useful arts from popular notions of the class affiliations of
the old and established schools and societies of the fine arts.

Henry Cole was key to this second phase in the development of the British model of design education. Cole had an interest in the Schools of Design from the very beginning. He was primarily a civil servant, having worked as an administrator in the Public Records, the postal and the railways services, but he took also keen interest in the arts (Burton, 1999). In the mid-1840s he began producing and publishing children’s books and illustrated guides to landmark sites, joined the Society of Arts and set about curating exhibitions of products (Boynthon, & Burton, 2003). Cole’s undertook his ‘art’ activities under the pseudonym of Felix Summerly, and towards the end of the 1840s had embarked on the manufacture of his own line of household consumer goods, commissioning highly regarded artists, including William Dyce and Richard Redgrave, to design them for him (Burton, 1999). This involvement in industrial arts and experience in the civil service led the Board of Trade to commission Cole in 1847 to write a series of reports on the status of the School of Design, and to appear in front of the Select Committee of the School of Design in 1849, to which he voiced his concerns over the governance structure of the school (ibid, p. 27).

In 1852, and after managing the Great Exhibition of 1851 in the Crystal Palace, Henry Cole was granted control over the now enlarged ambit of the Government Schools of Design (ibid, p. 27). Undoubtedly appointed in part due to his prior investigative work on behalf of the Board of Trade, Cole, as Superintendent of the new Department of Practical Art (to be recast as the Department of Science and Art (DSA) a year later), had oversight of the new Museum of Manufactures (also renamed as the Museum of Ornamental Art shortly after) and the Government Schools of Design. Influenced by his friendship with the utilitarian and philosopher John Stuart
Mill and surrounded by a vibrant community of artists and artisans, Cole, the consummate bureaucrat, set out to extend the mission of what was now an established and growing national system of schools of design by using a particular approach to the delivery of arts education to improve the design of machine made and serially produced British goods (Stankiewicz, 1992).
1.4.1 A Standard Curriculum for Design

Cole appointed painter Richard Redgrave to formalize the syllabus for the enlarged and national system of Government Schools of Design. Redgrave had been Master of Botany (botanical drawing) at the London School since 1847 (Burton, 1999), and as a colleague of Dyce he drew significantly on the broad educational vision that Dyce had set out. However, Dyce’s initial curriculum for the Schools of Design, while clearly directed towards the technical instruction of designers, was recast as an instruction in ‘practical art’. The new curriculum that Redgrave developed looked to enlarge the reach of the original premise for capacity development in design for manufacture of the Board of Trade.

With the development of design in industry there was an emerging sense that mass education in the practical arts could shift public tastes for material goods through the more sophisticated appreciation of form and utility that such an education provided. The combination of the training of designers, artists and craftspeople and the inclusion of the general public in the educational streams and growing artefact collections of the Department of Science and Art, that the Schools of Design were administered by, was intended to enable material sensibilities and underscored its development. Perhaps of most significance was that the new curriculum provided impetus for the development of a new national standard of art and design education, and was formally published in 1853 as the National Course of Art Instruction, consisting of four discrete streams for different types of students (Macdonald, 2004).

The original full funding and stipend that accompanied students in the Dyce years gave way, and only those students who were selected and able to undertake full-time study in the central London school and a handful of select regional schools were supported. On completion of the pinnacle studies stream, scholarship students were conferred the National Medallion. The
Introduction of fees for tuition allowed the program of study to be widened to the training of designers and artists, and opened up the system for an arts education for all manner of trades and interests. The pinnacle stream, called ‘The Course for Designers, Ornamentalists, and Those Intending to Be Industrial Artists’, included the final and exclusive Technical Studies stage and was reserved for the training of National Scholars – industrial designers and Masters who would take up senior teaching positions in the regional schools of design. These changes aligned well with the original mandate set out by the Select Committee and the Board of Trade and put in place the curricula conditions for broad capacity improvements in design for application within British manufacturing industries. The lower-level streams, while providing a more limited curriculum through students undertaking a reduced number of ‘stages’, were directed towards a much broader cohort that could study in the day or in the evening towards various vocations. These study stages included the ‘Primary Course for Schools, Principally by Means of Class Teaching’ that prepared students for teaching in branch network Schools of Art (by this stage the title of Schools of Design had been widely replaced by the term Schools of Art); the ‘Course for Machinists, Engineers and Foremen of Works’; and the ‘Course for General Education’ (Macdonlad, 2004). To teach designers, engineers, draughtsmen, machinists, technical illustrators, applied art teachers and indeed all manner of trades that interfaced with the production of consumer goods and capital equipment, a broad mix of technical, design and fine arts studies of differing durations was required.

The National Course of Art Instruction was comprised of 23 stages that could be taken in various combinations depending on the particular trade trajectory of the students and the course in which the student was enrolled (Denis, 1995) Drawing instruction occupied ten stages and included
ornamental drawing, figure drawing and drawing from nature, which entailed
drawing flowers and other natural 'ornaments' in relief and in perspective,
which was then termed 'in the round'. The examples students were tasked to
draw came from the School's collection of plaster casts and decorative objects.
Painting tuition occupied seven stages and reiterated the types of rendering
from models and given images used in the drawing stages. Modelling occupied
three stages and gave students instruction in various techniques of converting
drawings of decorative details and simple objects into approximations of
industrial processes (such as engraving), as well as basic instruction on
techniques in ceramics, including porcelain painting, carving, mould making
and casting. All students had to complete the ten drawing stages and then,
depending on their trajectory, would undertake various combinations of
the painting and modelling courses. Two of the final three stages were the
most applied and included; Studies of Life that engaged students in drawing
from life and from memory, with an emphasis on the temporal nature of
situations in both life and nature; and Elementary Design, focused on the
design of ornament and decorative patterns. The final stage, Technical
Studies, permitted selected students to apply their learning to the design and
production of something of their invention. It focused heavily on training
students in the proper use of workshop environments for the prototyping of
designed objects. These stages were delivered through a mix of theoretical
classes and lectures, the use of modelling workshops and the use of studios. As
many of the students were already employed inside manufacturing enterprises,
classes were often in the evening so that students could attend after their
working days had finished (Macdonald, 2004).

The scale of growth of the DSA in the first six years of Cole's management
was significant. 1852 he was given charge of 20 branch schools of art with
5,000 pupils (Sheppard, 1975); by 1858 there were some 56 Schools of Art with 35,000 students (Green, 1995), a standard curriculum, a teacher training school, a central examinations process and a regime of monitoring and inspecting the quality of the branch schools. This growth would continue and by 1882 “there were 151 Schools of Art (30,300 pupils) and 640 art classes (26,700 pupils), while South Kensington curricula and certificates in drawing were in use at 4,700 elementary schools with total rolls of 768,661 pupils” (Sheppard, 1975, p. 24). As a means of public education that sat somewhere between vocational or apprenticeship-based learning and higher education within the university, the South Kensington system schools had by the late 1850s experienced extraordinary success that was a stark contrast to the parallel attempts by the DSA to establish Schools of Science, which struggled to attract students (Green, 1995). Also administered by the Board of Trade, the Schools of Science initiative attempted in much the same way as the Schools of Design to build working-class capacity for British manufacturing sectors. As the century wore on the role of the sciences in industrial processes became more and more critical, and particularly in fields of industrial chemistry, metallurgy and electrical engineering. This initial division between the applied arts and the industrial sciences would continue to play out in industrial design education and was perhaps only ever really reconciled inside the workplace, where trained designers would learn to work with specialists from other fields.

At the centre of the National Course of Art Instruction curriculum and the ways in which it was structured within the Schools of Design model were three elements: an ever-expanding collection of drawing models and artefacts of industrial arts and sciences that came under the title of the Museum of Manufactures; a concentration on the faculty defining and articulating a set of rules for what constituted good design; and a mode of learning technical

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2. Owen Jones The Grammar of Ornament constitutes a good example of these rules.
design drawing that entailed continuous copying from given references. Despite its popularity and the obvious value that the Schools of Design provided industry, the curriculum generated complaints from within and criticism from the outside. For instance, the issue of copying as a means of learning to draw rather than the practical learning that accompanies active designing through drawing emerged as a long-running gripe for students, and the growth and active use for instruction, and for public access of the Schools’ collection of artefacts possibly compounded this feeling. Students, faculty, and highly regarded designers such as A.W.N. Pugin made public their concerns of the inadequacies of the curriculum, and gradually things improved (Burton, 1999).

For the vast majority of students, the National Course of Art Instruction was only ever able to offer a very basic training in art and design; real design capability for application into fields of product design for manufacture was quarantined within the higher-level and exclusive stage Course for Designers, Ornamentalists, and Those Intending to Be Industrial Artists. In many ways the popularity of the National Course of Art Instruction at the lower levels was due to its basic, almost remedial qualities, and it provided a means for further education for a populace that was coming to significantly value education as a pivotal mechanism for civic improvement. While the art and design community craved a system that took seriously the interactions between aesthetics and production, it required a cohort with a reasonable initial level of technical education. The vast majority of students across the network of Schools of Art had limited if any relevant technical literacy and generally quite low levels of basic education, so the National Curriculum of Art Instruction taught to a commensurate level.
1.4.2 New Rules for Design

The ‘rules’ for design that were developed in the National Course of Art Instruction were part technical, part rhetoric and part political, inasmuch as they were often used to argue the point that the mandatory continuous reproduction of drawings was all part of becoming skilled in the correct way to do design and decorative arts. Sometimes the rules were formally published and sometimes delivered through lectures and oral exchange in tuition. As
the museum collection expanded, and was arranged so that the general public and students could more meaningfully engage with it, these rules were used to explain the principles at work in the objects on display. Concerned with ensuring a particular quality of design, the rules, of which Redgrave and his peers in the faculty composed many, were often displayed as large posters throughout the school. They can be seen as an attempt to both impart a form of rigour in the ways objects could be interpreted in view of the design and articulation of new forms of ornamentalism for students, and to provide an education in how to appreciate design and decoration for the general public. One of these posters, entitled ‘General Principles of Decorative Art’ (1853), gives a glimpse into how the School and its museum’s multiple audiences were informed, and that design as an emerging discipline was being structured as distinct from fine art:

_The true office of Ornament is the decoration of Utility. Ornament therefore, ought always to be secondary to Utility._

_Ornament should arise out of, and be subservient to Construction._

_Ornament requires a specific adaptation to the Material in which it is to be wrought, or to which it is to be applied; from this cause the ornament of one fabric or material is rarely suitable to another without proper re-adaptation._

_True Ornament does not consist in the mere imitation of natural objects; but rather in the adaptation of their peculiar beauties of form or colour to decorative purposes controlled by the nature of the material to be decorated, the laws of art, and the necessities of manufacture._ (DSA, 1853. In Burton, 1999, p. 30)
Rules such as these served as a public pedagogy, insofar as they were made prominent within the public spaces of the School and its museum, and were published and transmitted to branch schools to be used in teaching. They played into a project of taste reform, and the philosophical arguments that surrounded it, that would mark the Cole years of elevating the crafts and design as an art (Quinn, 2015).

Owen Jones’ publication of *The Grammar of Ornament* (1856) was perhaps the most influential of these rules for design and became a mainstay of the Schools of Design Syllabus. As a resource for teaching and learning, The Grammar of Ornament consisted of a series of 112 plates of various geometric and ornamental patterns that students would emulate through drawing. Another book, *The Art of Decorative Design* by Christopher Dresser (1862), was also of significant influence in the establishment of a set of principles for design, and found its way into the curriculums of the Schools of Design. Other works from eminent architects, designers and theorists active in the British design scene were also influential; Gottfried Semper’s *Die vier Elemente der Baukunst* (1851) and *Wissenschaft, Industrie und Kunst* (1852) are both prime examples.
1.4.3 The Designer Cast

Important in the particular shifts of the value and meaning that Cole and his contemporaries brought to the British system was an idealized notion of the designer as occupying a new location between the craftsperson and the industrialist. This was manifested in the carrying over into design practice and design education of a historicisation of ideas of the workshop or atelier as some means by which design might be sufficiently trained to intervene in the often-austere machine-produced and serially manufactured products. By the mid-1800s such effects were no longer isolated to a handful of industrial cities. Factories producing all manner of consumer goods had proliferated across urbanised England, Scotland, Ireland and Britain’s colonies, across Europe and North America, and while the economic benefits of industrialization were substantial, the damage to communities in the fabric of urban life was showing. The Chartist movement for factory reform was popular amongst working people as a result of its lobbying for standardized hours of work and its campaign to improve the lives of the children who worked in factories (Saville, 1990). A succession of government Factory Acts directed at the textiles industries, beginning in the early 19th century, continued to put pressure on industrialists to improve working conditions.
The Board of Trade’s strategy to use education as a means of building design capability to directly influence industrial manufacture in the British Isles would be adopted across the British colonies. Industrial Arts training schools were developed in Canada, New Zealand, India and Australia. These schools each put a different emphasis on the location of design, be it for manufacturing, decorative crafts or the fine arts, and importantly each sought to attach applied arts education to different class structures. The Calcutta School of Industrial Art, established in 1854, focused its curriculum on capabilities for design and specialised in an education for design in the printing industries with subjects including engraving, etching and lithography. Very much directed at working-class people employed in the growing industries of Calcutta, by the mid-1860s it had been reconstituted as the Government School of Industrial Art and had a significantly expanded curriculum that included courses in basic or elementary design, technical design and design for manufacture. These design courses were supported by botanical, archaeological and industrial drawing instruction (Dutta, 2007: Burns, 1909).

These colonial interpretations were also subject to the social, political and economic conditions of the cities in which they were established. By the mid-1850s there was also a wide recognition inside and outside of Great Britain (Macdonald, 2004) that the original premise for schools of design as a way of developing industrial design capacity had been diminished, as the DSA rolled out its national curricula en masse to a cohort who perhaps had an interest in design but were unlikely to deploy it in a serious fashion as a vocation. There was a disparity between the levels of uptake of the popular lower-level courses
and the higher courses and streams that enabled more advanced capacity
development in both design and art. The streams of study focused on building
capability for the application of science – both inside the Schools of Art and
within the Schools of Science – in industry were very poorly subscribed
(Green, 2005), and a move was afoot to follow the lead of the French and
German models and institute polytechnics and schools of mines as institutions
that could provide the technical education required by ever more complex
manufacturing systems and industrial contexts. The Schools of Art were also
increasingly catering largely to a middle-class constituency, perhaps in part
due to socio-economic shift in the cities in which the schools were situated and
perhaps due to the sheer public popularity of aspirations of material culture
being able to be attained in a rather roundabout way through learning design
and the decorative arts. But what emerged out of the South Kensington system
both in Britain and the colonies was a mass technical education program that
for many, and especially for women, represented the only avenue for education
beyond elementary schooling.

The existing institutional climate, driven by universities, Mechanics
Institutes and societies, also played a major part in the ways these schools
either situated themselves as schools of art or schools of design. South
Kensington-modelled schools of design in New Zealand, for instance, were
founded from the 1870s and often prior to those of fine art. These schools, as
Calhoun (2000. Pp 19-21) suggests, were in many cities the only avenue for
both fine arts and design training, and adapted to institutional conditions that
were different from those in which the original schools of design had been
conceived. Schools of art and design were opened in Dunedin as early as 1870,
and then throughout the 1880s in Christchurch, Wellington, and Auckland,
directed by graduate Masters from the British Schools. Many of these
Masters made a career of setting up schools in the colonies; indeed, the South Kensington system, with its defined curricula and mass appeal, can be seen as an early form of educational franchise. David Blair, for example, established South Kensington-styled schools in Canada prior to relocating to New Zealand to establish the Christchurch School in 1882 and then the Wanganui School in 1892 (Chalmers, 1985).
These schools and the numerous societies of art that sprang up alongside them were significantly directed towards the technical and craft education of women. New Zealand was, in the second half of the 19th century, unusually progressive in its move to attain political and social equality for women, which of course required an education towards a vocation. Similarly inclined towards the status of women in the applied arts was the South Australian School of Design in Adelaide. Under the direction of South Kensington-trained Master Harold Gill, the Adelaide school by the late 1870s was providing its female students with a technical design education that was comparable to that of its male students (Broughton, 1998). The inclusion of women in these schools, in a way that the English Schools would not, was both a factor of the popularity of the antipodean suffrage movements and the fact that the cities in which many of these schools were established were very small, meaning the co-education of males and females in niche areas was both institutionally and economically prudent.

The types of art and mechanical drawing education that the Mechanics Institutes movement that developed in England in the 1820s and grew rapidly were largely displaced by the Schools of Art by the middle of the century. The British Mechanics Institutes were, as community-funded enterprises and often initiated by the middle classes for the working classes. In the Australian colonies Mechanics Institutes were extremely popular right through the 19th century and well into the 20th century, not just as places for technical education, but as community assets that served all manner of civic roles (Fennessy, 2007). The Sydney Mechanics School of Art that commenced in 1833 is a prime early example of the concept of public adult education as a civic instrument deployed throughout the colonies. Initially developed as a school of arts and sciences attached to a free lending library, the Sydney
Mechanics School of Art offered a working populace of often low levels or no formal education access to instruction in all manner of subjects – from classes in drawing and painting to architecture, to lectures in mathematics and even basic surgery. The Sydney School was supported by government subsidies, private benefactors and the goodwill of patrons who placed significance on the free education of peoples as critical to the development of a civil society. Towards the end of the 19th century the Sydney Mechanics School of Art began to focus more on technical education, to cater to a changing educational need in its community, rather than the basic education with which it commenced, and was reformed into the Technical and Working Men’s College (Ling, 1975).

From the mid-1860s new initiatives and ideas developed in the Australian state of Victoria that sought to disrupt and offer an alternative to the rather restrictive South Kensington model of art and design, and the issues that the British approach had produced for the state of science and engineering education and its relationships to industry. The rate of development of educational and cultural institutions in Victoria from the 1860s until the 1890s was quite extraordinary, and the need for design and technical education sat as central to many of these developments. As various venues for technical education for the working classes proliferated in the boom years that led out of the gold rush, the Victorian Government established the Royal Commission for Promoting Technological and Industrial Instruction in 1869 (Fennessy, 2007). The Commission had the task of monitoring and supporting what had been a rather ad hoc and 'ground up' approach to technical education that was emerging in the colony as it rapidly expanded, and can be seen as the first attempt in Australia to structure a government-funded system for technical and further education. One of the very first things that the Technological
Commission did was to support the founding of new and comparatively quite advanced Schools of Design by providing subsidies that helped schools procure and distribute consumable materials for drawing. These subsidies, while meagre, allowed the fees required from students to be significantly reduced. By the time the Technological Commission was disbanded in 1890, it had given support to the establishment in Victoria alone of some 39 Schools of Design, the development of the Melbourne Industrial and Technological Museum, the founding of two Schools of Mines and The Working Man’s College (Rushbrook, 1995; Fennessy, 2005).

Mechanics Institutes often adopted elements of the curriculum from the National Curriculum for Arts Instruction, and provided drafting, mechanical and freehand drawing instruction that while often quite basic provided workers with the capacity to both read and do technical drawing. By the 1870s many of the larger Mechanics Institutes in Australia were being morphed into much larger centres of technical education and trades training. The Ballarat School of Mines, which had its own highly regarded school of design, is credited as the first true technical institution in the state; it emerged from such a path in 1870 and others soon followed. The Sandhurst Mechanics Institute would, in seeking to develop a fully fledged School of Design in 1871, lead to it becoming the basis for the establishment of the Bendigo School of Mines (Rushbrook. 1995). The Schools of Mines differed in their approach to the use of design (as it was defined at the time) in that the design drawing they taught was directed primarily towards applications in civil and mechanical engineering, in which concepts of precision and detailed specification were fundamental requirements for drawing in ways that the conventional schools of design did not teach.
1.4.5 The Artisans Schools

The Artisans School of Design was established at Melbourne Trades Hall by the Painters and Decorators Union in 1869 (Fennessy, 2005) and provided a vocationally oriented training in design, drawing and decorative painting to equip workers with the skills required for the building boom that was transforming the city of Melbourne in the years after the gold rush. Within a year the demand for Artisan Schools led to the founding of 12 local chapters across Melbourne’s growing industrial suburbs, and the school located at Trades Hall, had some 160 students (Fennessy, 2007). The drawing masters included some of the colony’s most experienced painters and design educators, including Thomas Clark and the Swiss-born Louis Buvelot, and provided the initial training to some of the colony’s most important painters, including Frederick McCubbin. These schools provided two levels of design and drawing training (elementary and advanced) and were mainly attended by young adults, apprentices and workers who could undertake further study in the evenings. Classes were especially popular with young women looking to build drawing skills to be used in the growing teaching profession in which many women sought careers. Like Mechanics Institutes, the Artisans Schools commanded an enormous amount of goodwill from the community; drawing masters often taught for no payment; collections of casts and designs were donated as examples by local businesses and experienced tradespeople and modellers; and community leaders would regularly present awards and prizes to support and recognize the commitment to learning that the adult students demonstrated through the works they produced. They served as both a site for training artisans and the working class and for the bringing together of a populace that saw further education as crucial to self and civic improvement.

While the Artisan Schools catered to a broad constituency, the advanced level drawing instruction that they taught often went outside of the
conventions established through the South Kensington curriculum. As there was no direct affiliation with the DSA, there was no proscribed need to take the curriculum literally and only the elements and lessons useful to a particular cohort in a particular school were used. Similarly, as its teachers very often taught out of sheer interest, or as a practical way to craft their own practices as designers and artists, there was a freedom to take design drawing as far as a cohort wanted. Consequently the quite static drawing orthodoxies of the South Kensington curriculum, such as drawing ‘in the round’ and drawing ‘from nature’, often got subverted and students learnt to draw using complex perspectives and orthogonal projections and in observational settings (Fennessy, 2005).

This freedom to cater to a local community within the structure of the Artisan Schools was arguably a product of its trade union roots. The trade union movement in Victoria was, even by the middle of the 19th century, pivotal to the way the colony functioned, and its desire to construct a society that did not repeat the circumstances that many of the population had left behind (land clearances and the dysfunction of industrial cities) of England, Ireland and Scotland. The success of the union movement’s eight-hour day campaign in 1856 (Kimber, & Love, 2007), a reform that wouldn’t be matched in Britain for many years despite many Factory Reform Acts, is evidence of this collective desire to build a fairer society than those from which they had come. The association of the trade union movement to the interpretation of design as a useful model of technical education in Melbourne is important in that it clearly attached a value of education to its agenda in representing workers’ rights and working conditions, an association that would flavour the establishment of future technical education institutions their approach to the provision industrial arts education.
1.4.6 The Museum School of Design

While the Artisans Schools catered to the working classes and indeed to anyone that sought some form of further education, the level of art and design training for most was at best basic. Advanced levels of training for commercial decorators, draftsmen and those working in civil infrastructure schemes such as the railways tended to be delivered in the workplace. For those pursuing fine arts education or higher levels of training in industrial design and the decorative and industrial arts, or the refinement of technical and drawing skills for experienced artisans, architects and engineers, a rather informal School of Art and School of Design in what would later become the National Gallery of Victoria was available from 1867 (Fennessy, 2005). In the spirit of self and civic improvement these Schools were self-directed initially, where access to the gallery’s collection of casts, paintings and objects were made accessible to those who applied with references to study. Students of the school would teach themselves through practice and though peer-to-peer learning (Fennessy, 2007).

With the establishment of the National Gallery of Victoria in 1870 and after some equivocation throughout the previous year on how the self-directed school of design of the museum might be transferred into the new institution, a decision was taken to form within the new gallery a School of Painting and a School of Design (Fennessy, 2005). Thomas Clark was appointed master of design and brought with him a very particular experience. Aside from his recent involvement teaching within the Artisans Schools of Design, Clark was a very highly experienced Design and Drawing master with a background in the original Dyce years of the Schools of Design movement in England in the 1840s. Clarke had briefly been director of the newly established Nottingham
School of Design in 1843 before being appointed as anatomical draftsman at Kings College London, and then in 1846 as headmaster of the Birmingham School of Design (Macdonald, 2004). Swift (1988), in his history of the Birmingham School of Art, describes how Clark brought stability and an increase in enrolments. Swift paints Clark as a hard-working advocate for the needs of his school and the industrial community that supported it. During his tenure he expanded the number of teaching staff, argued for higher levels of resources from the central London school, and took design education to neighbouring towns and villages, but he also grew increasingly dissatisfied with the high degree of central regulation from the Central Government School and its regular inspections (Macdonald, 2004).

An award-winning painter and highly revered engraver, Clark emigrated from England in 1851 and settled in Victoria in 1852 (Galbally, 1969). Clark’s development as a design educator was established prior to the formulation of the National Curriculum for Art Instruction and the approach to mass education that the South Kensington system took after the appointment of Henry Cole. In a departure from the conventional boundaries of the role and purpose of drawing for design, Clark taught a particularly applied variant of design drawing for the purposes of manufacture at a significantly advanced level.

The National Gallery School of Design and the collection of industrially produced articles in the Industrial and Technological Museum would be relatively short-lived. In the early 1880s a new institution was initiated by the wealthy Scottish-born grazier and politician the Hon. Francis Ormond. Through a mix of Ormond’s own philanthropic contributions, state government support and funds raised by trade union members, Ormond’s idea for an institute for technical education was realized in 1887 when it was opened as the Working Men’s College of Melbourne (Murray-Smith, & Dare, 1987).
Located directly opposite the National Gallery Schools of Art and Design and the public collections of the Industrial and Technological Museum, the new college sought to formalise a local legacy of established industrial arts, crafts and technical education offered to the populace of Melbourne. Existing institutions such as the Industrial and Technological Museum, the Gallery Schools of Art and Design, the numerous Mechanics Institutes and Artisan Schools, and notable technical education models such as the Sydney-based Technical and Working Mens’ College and the Ballarat and Bendigo Schools of Mines undoubtedly influenced the structure and charter of the new College (Fennessy, 2005). However, it was also aligned with a new generation of British educational models growing out of the now mature South Kensington system of Schools, including from the London College of Arts, the numerous regional British Schools of Arts and the London’s Working Men’s College.
1.4.7 North American Beginnings

In North America a variant of the Arts and Crafts movement that came to be called the Aesthetic Movement emerged in the mid 1800’s (Stankiewicz, 1992). This movement, with its origins in the thinking and rhetoric of Ruskin, lagged somewhat behind the shifts in a similar vein on the other side of the Atlantic. The Aesthetics, or Aesthetes as they were often called, looked to the East for an alternative to the highly utilitarian nature of North American serially produced goods. However, the orientation of the Aesthetes differed from the rhetoric of the British Arts and Crafts movement in that they appeared more willing to engage with the new industrial reality. They perhaps didn’t have much choice, as the crafts traditions that the Arts and Crafts movement drew from were not nearly as strong in North America as it was in Europe. In many ways the local craft traditions that had developed in the United States, including those of the Shakers, were seen as parochial and vernacular and didn’t quite carry the same cultural value in urban centres as the arguably equally parochial and vernacular traditions that the Arts and Crafts movement and other European schools of thought looked to for inspiration. Industrial Arts education in the United States had only a small number of providers by the mid-19th century.

With the continual influx of entrepreneurial and highly skilled migrants, many of whom had been trained in design and industrial arts in Europe, the North American design capacity steadily developed throughout the 19th century. One such migrant was Walter Smith, a graduate Master from the South Kensington system and author of the influential Art Education: Scholastic and Industrial (1872). Walter Smith would make a lasting impact on the nature of art and design education in North America. While the interpretations of the
South Kensington system of education in arts for industry had been widely adapted into US schools and colleges by the 1880s (Stankiewicz, Amburgy & Bolin, 2004), the development of design education in North America was quite critically supported and propelled by a series of interconnected elements that coloured the development of its design education.

The US patent system provided legal rights afforded to all citizens to protect their designs and inventions. The patenting process tended towards the technical and industrial; it was possible to legally protect both a technical innovation such as a mechanism or a process and the application of an existing or new technical innovation to a specific function. Technical drawings and illustrations sat as a key legal device in this system and elevated the currency of the drawing quite significantly. The importance of the design drawing led to a curious piece of legislation that enabled a particular kind of industrial arts education practice that sought to build a capacity in the general public to engage in with the visual currency of industrial manufacture. The Massachusetts Drawing Act of 1870 put in place a requirement for all public schools in the state to include instrumental drawing within their curriculums, and for towns of a certain scale to provide free mechanical and industrial drawing instruction to any person over the age of fifteen (Cary, 2005; Bolin, 1995). The Free Drawing Act, as it has come to be called, had at its core the belief that the industrial or design drawing that had proved so successful in the growth of industrial enterprises in Great Britain ought be commonly and widely practised. The Act was quite quickly replicated in various state legislatures across the United States, and industrial drawing – the technical drawing of forms to communicate specifications for manufacture – became an instrumental part of the educational construction of meanings for both art and design. In 1871 Walter Smith was contracted as the State Art Director
of Massachusetts and Director of Drawing in Public Schools in Boston that oversaw the implementation of drawing instruction in schools and adherence to the Free Drawing Act (Green, 1966; Stankiewicz, Amburgy, & Bolin, 2004). An ardent advocate for the role of drawing in all levels of education, and particularly in elementary and compulsory education, Smith’s influence in the United States and across the English-speaking world continues to this day. Stankiewicz, Amburgy and Bolin (2004) provide a detailed history of development of the Free Drawing Act and its implications for fine arts education and the ways art was constituted across all levels of compulsory education.

As a rapidly expanding industrial economy, the US had significant limits to an available manufacturing workforce and a highly competitive business environment. Concepts of standardisation provided a means by which quality in production and consumer expectations of the qualities of a product could be assured. The drawing was used by American industrialists as a pivotal mechanism for enabling greater standardisation for both commercial, industrial and workforce needs. Indeed, the Drawing Act of 1870 can be seen as such a strategy in the ways it pre-trained school-aged children in both visual and technical literacy as a necessary capacity for employment in many industries. As one of first and one of the very few forms of fully publicly funded forms technical training available to the North American public drawing instruction became highly valued.

Unlike the inclusive models of art and design education emerging in the New Zealand and Australian colonies, the position of women in design in the United States took a different turn. Several women-only schools of design were established quite early in the United States, the earliest being the Philadelphia School of Design for Women in 1848, followed by the New York School of Design for Women in 1852 (Chalmers, 1996; Allaback, 1998). Based on
the female-only school that sat alongside the London Government School of Design, and its branch schools, these initiatives in the US were begun by female philanthropists who saw a vocational education in the decorative and applied arts as valuable to the status of women with the emergence of a metropolitan American middle class. However, these schools had critical differences from those in England: they were neither funded by government, nor annexed to equivalent male schools. Despite their stand-alone status and reliance on private funding, these schools for design for women were very popular and well supported by the growing art, design and industrial communities, but as Pat Kirkham (2002, p. 51) indicates, perhaps not for reasons of a support for universal suffrage. Walter Smith, for instance, championed the development of women’s schools of arts and design as a way of keeping women busy, and saw the South Kensington model as a useful mechanism in North America by which women might ‘...flock to the studio and let the ballot-box alone.’

A specific model of how a design ought to work formed through the second half of the 19th century, and was significantly influenced by John Ruskin and his growing circle of artists, artisans and aesthetic elite. The early years of the design schools movement had been focused on equipping the manufacturing industry with designers who could work for the betterment of industry, to improve the quality of British products and thus the capacity of British producers to compete with imported goods, and to build new markets for export. Much of this work was concerned primarily with notions of decorative detail, such as painting or relief patterns on chinaware, that allowed manufacturers to quite easily establish new product lines and to use decorative differentiation as a stylistic device to build new markets for their products. The emerging arts and crafts movement that Ruskin championed saw Cole
administer an educational system that reacted to the idea of art and the artisan being made subservient to the demands of the new machine economy and sought to correct it by repositioning the designer and design at the centre of the craft production enterprise. While Ruskin spoke about the joy and near-spirituality of craft-work, the economic opportunities that a contestation of new forms decorative specialization toward notion of luxury drove Victorian consumption (Hilton, 2004). The system for the education of prototypical industrial designers slowly morphed towards an education in applied art, in which craft was seen as a noble endeavour for design to reconstruct in its own ways, and where the agency of an education in design was in its capacity for the reform of material culture sensibilities to an expanding and highly consumerist middle class.

Through this period we see a continual increase of new forms of consumerism that had previously been the preserve only of the upper classes. Business constructs of fashion and the gimmick, combined with the lower unit costs of production of machine-made and mass-produced products, allowed people to approximate standards of living that were previously inaccessible and to begin to engage their material lives in ways that represented a demonstration of ‘taste’. The urban middle classes were growing, and that growth in social status and income translated through the economy into its manufacturing sectors and ultimately to the employment of designers. The desire from employers for contextually appropriate design sensibilities and ever-higher levels of capacity in design in turn fed back into the schools of design, which by their very nature both built demand and limited supply. Penny Sparke, in her history of the development of design in the 18th and 19th centuries, attributes this as the seed for ‘design’s inevitable link with the growth of (the) capitalist economy’ (1987, p. 9).
As the cost of labour gradually increased to deal with the inflationary effects of greater urbanization, technical innovation in the efficiency of production processes became the focus of much of the engineering and business thinking of the time. These efficiencies offset the wage pressure while increasing production. Growth in the demand for consumer goods in turn drove investment in the infrastructure, technologies, and the labour that was required to make supply. While previous modes of production envisaged the role of the producer, and therefore the artisan, as one of meeting demand, the mass manufacturing of the second half of the 19th century required a different logic. Increased efficiencies meant that the supply capacity of production facilities began to take precedence. To prevent oversupply demand would be artificially stimulated through various strategies, in which the decorative traditions and aesthetic ideals carried through design education and practice played an important role. As the business of manufacture became bigger and bigger, the older and highly valued modes of craft and hand production that managed to survive became more and more exclusive.

The aesthetic and philosophical orientations of the Arts and Crafts movement, and their influence on design can be seen as a reaction to the many difficulties of the Victorian period of industrialization. But as ideas of the economics and the aesthetics of art and design were adapted to the gathering machine age, the agency of design in contending with such a change was of course not as simple as the rhetoric conveyed. The globally distributed proponents of the Arts and Crafts movement and the North American Aesthetic Movement used to their advantage a constructed and value-laden narrative of practice as an ideological lever for the attribution of value to their wares. Other shifts in the meanings of design – and therefore design education – occurred elsewhere but with different effects, and for differing motivations.
However, central to the construction of meaning for a developing discipline of industrial design was an awareness to the social implications of industrial manufacture. A belief that design could, through its particular negotiation of the art and science of design for manufacture and consumption, enable real improvements to cultural and material conditions of ordinary people gradually developed.

Despite its many pedagogic failings, the establishment and growth of the South Kensington system of design education activated the conditions and capabilities for these meanings to be developed and contested. Through the patronage of Prince Albert, and through continued government subsidy, this negotiation of meanings for design education in the Schools of Design would be carried over and re-interpreted throughout the British colonies and would significantly define the ways in which ideas of industrial design would develop in the context of technical and decorative arts education. The DSA, as a division of the Board of Trade, played an essential role in this through the public and educative value and through the cultural capital that was built via its collections and communities of practice, and particularly in the later consolidation of the original museum collections into the South Kensington Museums in 1857 (re-named the Victoria and Albert Museum in 1899) (Burton, 1999). The locating of design practice within the context of the museum had profound public impact on understandings and valuing of design, both for the projects of production and consumption and for the ways a society thought about the aesthetics and utility of its material and technological culture.

Concurrent and sometimes competing meanings of design education as a strategy of reform would develop throughout the second half of the 19th century.
century. The vocational artisan-focused training that had brought such prestige to the French and German design and crafts industries in the first half of the century were themselves following the lead of the South Kensington system and restructuring towards more institutionalized modes of education removed from the vocationally oriented atelier and manufactory, while at the same time the English-speaking world was gradually adopting European technical education approaches. While the early years of the British Schools of Design initiative was a response to the growing successes of the educational models of German cities and other industrialising European centres, a gradual and reciprocal incorporation of other institutional and curricular structures would commence. Hennock (1990) provides a detailed tracing of the British emulation of the German model of the Polytechnic School (Technische Hochschule) of industry-focused science and engineering education, of which the South Kensington system would itself become a significant provider through the second half of the 19th century. Although the technical education systems that had long been established in the polytechnics of the Continent allowed the emerging European variants to be far more specialized than the general applied arts instruction that was offered by the DSA, the rate of global transference of elements of design and industrial arts education meant that internationally generalizable models began to emerge. This emulation of institutional models went both ways, and by the late 19th and early 20th centuries, German models of design education moved through Werkbund styled arts and crafts schools to dedicated art and design schools such as the Bauhaus in ways not too dissimilar, albeit ideologically modified, to the British Schools of Design.

Towards the end of the century the DSA’s activities became increasingly preoccupied with their museum collections. While the national curriculum
remained, it had tended toward the training of artists rather than designers and was often unsupportive of the specific curricular adaptations undertaken by the branch schools in connecting the activities of their students to local industries and local needs. Many of the branch schools of art and design became independent or were absorbed into larger institutions, and new variants emerged that looked to reinstate the original proposition of working and middle-class technical education that interfaced with industrial production as per the original Board of Trade design reform agenda. Schools such as the Central School for Arts and Crafts\(^4\), founded by William Lethaby\(^5\) in 1896 (Roberts, 1957), looked at the technical and design education that had developed outside of the tight control of the National Curriculum of Art in the colonies and in North America and its inspections and examinations, and sought to reintegrate the aesthetic concerns of design as an art and the commercial and technical concerns of design in the production domain. As the design community grew and began to specialise, the breadth of purpose of schools of design associated with the DSA similarly sought to specialise, or to focus more attentively to their local constituencies. With direction from now experienced designers, the monopoly of the DSA on design education itself began to wane, with new schools with new ideas for design emerging, such as the Guild School for Handicraft founded by Charles Ashbee in London in the late 1880s (Crawford, 2005). However, many of these new meanings of the purpose and pedagogies of design, while contextually contingent, have at their roots an attachment to or a differentiation from the proliferation of South Kensington-styled schools that until the turn of the century and indeed well into the new century would not be significantly disrupted. New concepts for technical and arts education leading up to the outbreak of the First World War would further specialise fields of design as professions. In the years after, with the emergence and decline in Germany of the Bauhaus and other schools, and the shifts in North American design education that took effect under Roosevelt’s New Deal, meanings of industrial design would be iteratively cast and recast, layering ideals of the new over the old.

\(^4\) This would become Central Saint Martins.
\(^5\) William Lathaby was mentor to Muthesius a pivotal figure in the Deutscher Werkbund and the early years of the defining what would become the Bauhaus.
2. Disruption and Codification: The Professionalization of Industrial Design

The impact of the South Kensington-styled Schools of Design on the development of design education in the English-speaking world by the turn of the century was both profound and pervasive. However, the localization of curriculums of design provided opportunities for adaptations to the rather staid curriculums of the DSA. In its first 50 years of operation the Melbourne Working Mens’ College grew with the addition of new areas of study including the arts, engineering and various technical disciplines, and like many technical and training institutions of the time it played a major role in the training of military personnel and the retraining of servicemen returning from World War I. Unlike the British separation of design from both institutions of technology and fine arts, this combination of technical and creative disciplines had remained a key characteristic of further education in the Australian context. At the Melbourne Working Men’s College, various prototypical industrial arts, engineering and design curriculums with a significantly technical focus developed in the first few decades of the new century in response to local industry needs, including dedicated automotive design and engineering training programs. However, as the influence of the Arts and Crafts movement and its North American and European variants filtered through practice and into education, and the industrial processes used in manufacture became more complex, new ideals for design gathered momentum and education in specializations of arts for industry, such as textiles design, and design from mechanical engineering or production optimisation perspectives began to form.
2.1 Pressures from Practice: The Profession in Education

The general approach to design and design education as an economic lever commenced through the British Schools of Design was replicated in various ways throughout Europe by the turn of the century, despite tending toward an elevation of craft practice and resistance to machine production. In the relatively recently unified Germany in particular there was a push through the development of arts and craft unions for a greater emphasis in education to interface between design as an aesthetic discipline and a rapidly growing machine-based manufacturing sector. State-sponsored activities through the Deutscher Werkbund (Burckhardt, 1980) and other associations of industrialists, artists and designers promoted the notion of design and education as a means to leverage industrial production techniques for economic imperatives (Banham, 1967). However, with the advent of World War I the progression of design education would be disrupted, while the systems and technologies of industrial production would be rapidly scaled up.

The 19th century had seen ideas for industrial design as a prototypical vocation emerge through programs of government-sponsored further education. The curricula of the DSA would, in being readily adapted to local arts, crafts and industrial conditions throughout the industrializing world, generate new popular appreciations for material culture, new forms of consumption and new design techniques for manufacture. However, the centrality of the role of the educational institution in driving the development of the discipline in the 20th century in many ways was redirected via pressures from practice. The gradually codifying profession of industrial design began making its own interventions into education, where method and theory for
design in practice were abstracted and conflated with pedagogies and curricula.

The interloping of professional designers into education transformed nascent curricula of industrial design into a set of pedagogical orthodoxies. This saw the historical educational focus on the provision of assumed and generic capabilities in design for translation into practice refined towards quite specific methods for industrial design. Curricula thus morphed from technical exercises in design to being approximations of an idealized professional design practice. Industrial design education thus inched incrementally towards disciplinary codification; both reactive to pressures from practice and proactive in the furthering of practice.

This chapter traverses a set of key moments in the development of pedagogies for industrial design through the 20th century as a way of illustrating the mélange of curricular and disciplinary priorities that would be transmitted, adapted and adopted the world over. While the previous chapter focused on the British contribution to the development of prototypical Australian curriculums of industrial design through the 19th century, the 20th century was marked by educational and methodological contributions from Germany and the structuring of discourses for professional practice from the United States. The chapter builds a background to the nature of the pedagogic construction of industrial design inside institutions of further learning. It concludes with a discussion of how industrial design education moved out of dedicated schools of design and technical colleges to operate inside the contemporary university context that now forms the dominant location for design education and design research.
2.2 Bauhaus and Design Education as an Ideological Project

In a new century and in the rebuilding of World War I there was a broad consensus from the Weimar elite on the need for a new concept of arts and crafts education. With the merging of the resources of two existing schools, and significant support from a new Weimar Republic autonomous government, the Staatliches Bauhaus was established in 1919 (Banham, 1967; Droste, 2002). Headed by architect and artist Walter Gropius, the concept offered a radical redefinition of the kinds of applied and fine arts education for which Weimar had long been known. Arts academies and craft schools such as the Großherzoglich-Sächsische Kunstgewerbeschule and the various free drawing schools had taught capabilities in design for artisanal and manufacturing vocations in Weimar from as early as the 1770s. The desire for change in the aftermath of the war elevated many ideas for design and design education that had been bubbling away through the Werkbund movements and through a strong association of German designers and critics to the British Arts and Crafts movements and the successes it had generated through the DSA.
Central to the Bauhaus concept was the idea that through a craft and design-based education practices of art could be directed into a new form of expression unconstrained by historical tendencies (Droste, 2002). Framed around the idea that ‘old’ models of art, design and architectural education limited the capacity for the generation of a new form of society (and its material cultures) through a continual reiteration of things from the past, the proposition was bold. Gropius’s ideal of the ‘unification’ of the arts produced a curriculum that, while focused on a new aesthetic and with a politically and socially progressive agenda, was rooted in a Morrisian rhetoric of the value of handicrafts and structurally quite similar to the model of education developed through the British Schools of Design more than half a century earlier. Where it differed pedagogically was in the abstraction and dissolution of barriers between different disciplines of the arts and in the introduction of students actively designing, as opposed to replicating, from the beginning as a way to develop capabilities. In doing so it tried to induce new ways and new meanings for design in the modern period. However, it maintained long-established master–apprentice delineations and maintained an implicit hierarchy of design disciplines (Banham, R. 1967) in which architecture sat as the capstone domain of study.

The Bauhaus curriculum comprised of an introductory or basic course in design called the Vorkurs that provided a common immersion in art and design theory, emerging ideas of colour theory, formal and structural studies of design, and practical and experimental exposures to the manipulation of various materials. The Vorkurs was taught by important artists and artisans of the time, including Paul Klee, Josef Albers and Wasily Kandinsky, and in the
early years was led by Johannes Itten, who imparted his own rather abstract pedagogic logic, in which students would be taken through a series of exercises to unlearn prefigured notions of design, art and craft. Itten’s approach privileged a concept that through actively designing as an experimental and exploratory process, rather than through a studying of design, a student’s innate creativity could be revealed (Banham, 1967). This approach would become a signature pedagogy of the Bauhaus and appropriations of it would be deployed in design and architectural education throughout the world for many decades after. However, Itten combined the Vorkurs with his interests in various streams of mysticism and Eastern philosophies, giving it a particularly radical, even romantic flavour in an increasingly rationalistic time.

In many ways the Vorkurs foundation course can be seen as a necessary
remedial education through which students whose education had been disrupted by the chaos of World War I could be reoriented into formal education towards professional and creative practice. It emphasized experimentation with materials and abstraction of forms, and once completed learners transitioned into more specialized areas of craft work – as the practice common to all fields of art and design – through a research-oriented workshop-based curriculum. Workshops included metalwork, carpentry, weaving and textiles, ceramics, wall and glass painting and typography. Each workshop was in theory co-taught with a ‘master of work’ who gave emphasis to the craft and artisanal aspects of learning, and a ‘master of form’ who looked to integrate concerns of art, although in the early years this wasn’t always the case and often workshops had just one master (Bergdoll, Barry & Dickerman, 2009). Each master brought their own orientations to Gropius’s proclamations of the purpose of the Bauhaus and a collective spirit of experimentation was forged. Learning culminated in the integration of new products, forms and practices being played out in ‘the building’, where students would situate their learning, through the items designed and produced, into a collective showcase of the integration of the arts as an applied discourse toward eventual architectural innovation. For the first few years of operation and after three years of study students would receive a journeyman’s certificate after a successful examination from the Weimar Chamber of Crafts, which provided a pathway towards completing an apprenticeship (Banham, 1967).
The focus of study in the early years of the Bauhaus was very much tilted towards the generation of new forms of artisanal practice and aimed not to explicitly direct students towards discrete professional roles and vocations, although implicitly it naturally did. Nor did it embrace in any overt way the integration of machine-based production methods of a mass-manufacturing discourse that industries surrounding it were rapidly acquiring. The rather utopian and initial ideals to unify the arts were modified over the first years of operation, and a greater focus on design for new forms of mass manufacture and a greater inclusion of new technologies took hold; the phrase ‘Art into Industry’ was held up as a mantra of the curriculum.

In 1925, due to political and financial tensions, The Staatliches Bauhaus relocated from Weimar to the emerging manufacturing centre of Dessau and into a new building designed by Gropius (Banham, 1967). The school was renamed the Hochschule für Gestaltung (HfG) Bauhaus in 1926 and the journeyman’s certificate was replaced with a diploma. The nomenclature for the faculty was similarly recast, from, ‘masters’ to, ‘professors’, and for a few years the school thrived. The industrial city of Dessau provided a rich environment for the school to explore the potential of new manufacturing materials and processes and the business environments and intellectual communities that sat behind them. Building on the commercial successes of the ceramics workshop at Weimar, the school initiated its own company, Bauhaus GmbH, in which students and staff worked together on the commercialisation of designed goods. Gropius stepped down from directorship in 1928 and the role was taken on by architect Hannes Meyer, who had briefly served as the head of the Bauhaus architecture department. Meyer

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progressed the school and its emerging focus on activities that approximated industrial design and design for mass production. The curriculum was revised towards a greater emphasis on the social functions of architecture and design and a resistance toward the generation of luxury goods and a value of the needs of people was encouraged in the school community.
2.2.3 Workshops as Sites for Design

In Dessau the specialist workshops and studios began to focus more on the inclusion of new materials and the design of mass-producible products. Importantly, the workshop specializations privileged notions of the functional design prototype, for both products and buildings, as a device that could act as a currency of design in conversing with manufacturers and an increasingly design-literate consuming public about the particularities of a new form of product (Bergdoll, Barry & Dickerman, 2009). Students developed their own projects alongside commercial and speculative projects being undertaken by the ‘professors’ through the Bauhaus GmbH company, many with considerable success. In the context of the development of modern industrial design education, the Metalwork and Carpentry workshops from the Bauhaus Dessau period in particular stand out as significant.

The Carpentry or Furniture workshop was initially led by Johannes Itten while in Weimar and then by Gropius from 1922. In these early years the workshop maintained a conventional wood-based construction approach but looked to experiment with new forms for furniture. From 1924 to 1928 the workshop was led by Marcel Breuer, a journeyman from the Bauhaus who had studied under Gropius in the Furniture workshop. Breuer looked to innovate furniture design and production through a process of reducing extraneous and decorative elements and introducing new materials and processes. Breuer, with several products under production, engaged the workshop with manufacturers and brought forward new ideas of serial production and standardization of fittings and fixtures as well as the introduction of lightweight tubular steel and plywood. The designs generated from this workshop under Breuer’s direction are indicative of the modern designerly approach that the Bauhaus pursued to
ultimately redefine a field of design and production that had long been locked
by craft traditions and local vernaculars.

In the first few years of Bauhaus in Weimar the Metal Workshop was also
led by Johannes Itten and the curriculum tended toward the development of
individual items of copper, gold and silver smithing. The Workshop’s capacity
to generate innovative new products was accelerated with the addition of
Christian Dell as master of works in 1922 and then with László Moholy-Nagy
in 1923 as the new master of form to replace Itten. In this period work was
directed towards developing functional prototypes for mass markets and
mass production. The workshop developed its own serial production line to
produce simple metal products, such as lamps and tableware designed by
Bauhaus members, and on relocation to the new Dessau School building many
of its fittings and fixtures were manufactured inside the metal workshop.

Under the new directorship of Meyer and the temporary supervision of the
metal workshop by Marianne Brandt, the curriculum was again modified and
commercial contracts for the manufacture of Bauhaus-designed goods were
signed with various manufacturers. This outward-facing approach contrasts
with the rather introspective beginnings of the Bauhaus.
2.2.4 A Creative Commune Dismantled

Bauhaus staff and students were prolific in their generation of new ideas for design, and with the success of the school and its growing reputation both inside and outside of Germany it began to form as a kind of creative commune. The professors wrote numerous books and promoted the mission of the school through exhibitions and public events, and the students engaged in a progressive politics. However by the end of the 1920s, with increasingly unstable global and local economies, soaring unemployment across Germany and the rise of the National Socialists as a political force, the progressive nature of the Bauhaus and its ambitions soon became untenable in Dessau. Meyer resigned from the School in 1930 under pressure from the city council and many from within the School for his political orientations, and Ludwig Mies van der Rohe took on directorship (Banham, 1967).

During Mies van der Rohe’s tenure at the Dessau School the pressures from government were overwhelming. The capacity for students to engage in any form of political action was curtailed by a new school constitution, students were required to reapply for admission to the school each year, and the school’s revenue streams were diminished with the production of Bauhaus GmbH goods at local factories halted. The curriculum was again revised and the focus of the school shifted away from industrially produced consumer goods towards architecture. The Dessau School was eventually ordered to shut down by the Dessau city council in late 1932, and Mies van der Rohe organised a relocation of the HfG Bauhaus to a disused factory in Berlin, but it was to be short-lived, closing for good by the middle of 1933 (Banham, 1967).

Throughout the 1930s and in the lead-up to World War II, many of the faculty and graduates of the Bauhaus emigrated from Germany and deployed
their experiences in new forms of design education all over the world. For instance, shortly after his dismissal from the Dessau School, Hannes Meyer relocated with a cohort of Bauhaus members to the Soviet Union to continue his particular concept of design for the furthering of communist ideals, then took up a directorship at the National Polytechnic Institute in Mexico City, and eventually returned to Europe after the war. Through émigrés the ideas of the Bauhaus, both as an educational model for design and as a redefinition of the ways in which designers considered form, material and process, were continued and adapted for different cultures and different times in quite intensive ways for the next few decades.

As the Bauhaus curriculum or elements of it were adapted to new contexts, its meanings became significantly plastic and mobile. It offered a new central thread to design education in the abstraction of form through exploratory material activities towards the generation of functional objects and architectural designs. In the English-speaking world this constituted a major shift in what had become the dominant modality adopted through the DSA’s focus on the replication of form through drawing as an early stage of learning design. It was through a combination of the adaptability of aspects of the curriculum and the global dispersion of networks of the Bauhaus community that the approach to design formed would be so influential in the ongoing development of design education. The impact of Bauhaus faculty as design pedagogues in the United States was of particular influence, with Lászlo Moholy-Nagy founding the New Bauhaus in Chicago in 1937 and Gropius taking on a professorship in architecture at Yale University in the same year (Borchardt-Hume, 2006; Margolin, 1997). Mies van der Rohe would also emigrate to the United States, and took on a teaching post at the Armour Institute, soon after formed into the Illinois Institute of Technology.
(Kentgens-Craig, 2001). Indeed, the spreading out of Bauhaus members into design education, design practice and architecture throughout Europe and the Americas in the lead-up to World War II and its aftermath ensured that the ideals and methods of design in education formed in its 14 years of operation would continue to be transmitted and translated for many decades to come. With an effect not dissimilar to that of the proliferation of the South Kensington system of design education and the global dispersing of graduates as design educators throughout the second half of the 19th century, the pedagogic legacy of the Bauhaus reached through the recounting of the school and its moments into industrial design and particularly architectural education across the globe.
The impact of Bauhaus ideas on design and design education inside the United States from in the 1930s contributed to a rich period in the development of industrial design. Built on meanings for practice from local combinations of the act of design drawing, standardisation for industrial processes and the craft orientation of the Aesthetes movements, by the early 20th century the term ‘Industrial Design’ began to replace the use of ‘Arts in Industry’, and by the 1920s it was widely used both inside and outside of the United States. While used in the initial rationale for the need for an institutionalised model of further education in design for manufacture by William Ewart and the Select Committee in the 1830s and the initial curricular framings of the Government School of Design by William Dyce, the term industrial design had been largely forgotten until that point.

The 1920s in North America, and indeed most advanced western economies, was a highly affluent period marked by very high volumes of material goods production and consumption. Ideas of industrial design inside education grew with new combinations of the practical act of drawing and craftwork as central to the practice of design, and the nascent role of the industrial designer became entrenched in servicing the needs of the producer as a stylistic creative practice that packaged the utility of objects into marketable commodities for mass consumption. Ideas for design inside education that had been dominated by notions of the designer as a kind of commercial artist as central to the meaning of design were systematized through and positioned within American models for production. Models of efficiency such as those made near universal by Henry Ford and Frederick
Winslow Taylor were even by the 1920s quite prominent in the construction of meaning for industrial design inside education. Professional associations of industrial design inside the United States grew rapidly, and raised expectations that new designers should be educated to practice in particular ways so as to service particular industrial settings and consumer markets (Gantz, 2014).

In the aftermath of the stock market crash of 1929 rates of unemployment skyrocketed and manufacturing output plummeted, leading to a rather radical program of socialisation of labour conditions and new acts of legislation to stimulate the depressed US economy under President Roosevelt’s New Deal from 1933 until 1937. In this period, ideas developed through industrial design as a new form of consulting practice for manufacturers by Norman Bel Geddes, Raymond Loewy and Henry Dreyfuss (among others) were augmented by new notions of design as a strategic discourse to both activate and accelerate cycles of consumption (Smith, 1994). These ideas, made popular through the likes of influential advertiser Earnest Elmo Calkins and his book *Consumer Engineering: A New Technique for Prosperity* (1932) set up new inclusions of concepts from consumer psychology and product marketing that gradually filtered through industrial design practice and into its forming education.
Despite a steady focus in North America on design education for manufacturing from the mid-19th century, modern industrial design, as a defined discipline, started in earnest almost simultaneously at Carnegie Institute of Technology (6) in 1934 and the Pratt Institute in 1935. Central to the development of both programs were designers Donald Dohner, Alexander Kostellow and Rowena Reed (Hannah, 2002), who – no doubt influenced by the successes of the Bauhaus – produced a practical curriculum that would be emulated in many design programs for many years to come. These two early programs were rapidly complemented by post-Bauhaus-styled programs, including Moholy-Nagy’s New Bauhaus in 1937 (Findeli, 1990; Borchardt-Hume, 2006) that would in turn set off the transition of arts and crafts design-oriented curriculums. Industrial design in North America became significantly future focused, and used this outlook as a method for the styling and re-styling of products as material discourse for economic development through mass manufacturing and accelerated consumption. American concepts of industrial design were not without their critics. Social critics such as Lewis Mumford and the growing Humanist movements inside design railed against the effects of such an uncritical and producer-centric concept of design. These orientations to design, while clearly generating advances in the aesthetics and the technical factors of mass-manufactured goods, polarized meanings of design and in some ways can be seen as the catalyst for design education’s fixation on notions of ‘good design’ that would play out for the remainder of the 20th century and continue to do so.

2.3.1 The Origins of Modern Industrial Design Education in Australia

In 1934 Melbourne’s Working Mens’ College formally changed its name to the Melbourne Technical College (Murray-Smith & Dare, 1987). While the relationships to meanings of applied arts and design were dominated largely by British concepts, emerging North American notions of industrial design in practice and in education gathered influence. Many of the large manufacturing operations established in Melbourne were either subsidiaries of North American or British multinationals or were utilising foreign designs under licence for local manufacturing. Increasingly there was a local demand for industrial designers, and what could be regarded as the first dedicated and modern industrial design course in Australia was commenced in 1945 in the School of Art at the Melbourne Technical College under direction from sculptor and arts educator Victor E. Greenhaigh. Greenhaigh had himself been educated in the Design School of the Ballarat School of Mines, completing study in Architectural Drawing in 1918, and saw in the North American push towards dedicated study of industrial design an opportunity to progress the schools arts in industry programs. By the late 1940s and under the new management of Melbourne artist and educator Alan Warren(7), the course became progressively more structured as a full program of industrial design and was permitted to issue a designated Diploma to graduates.

7. Alan Warren would manage the Industrial Design Program at Melbourne Technical College until 1955 when he left to establish a similar program at Prahran Technical College (later Swinburne University).
In the years immediately following the close of World War II, Germany was radically transformed through the rebuilding of lives, industries and institutions. In conditions not dissimilar to the rationale for the establishment of the Bauhaus in the years after World War I, the spark for a new epoch of German design education gathered momentum. In the aftermath of World War II the German higher and adult education system was incrementally restructured, creating opportunities for experimental models of further education. In the late 1940s Graphic designer Otl Aicher and Inge Scholl partnered with former Bauhaus member Max Bill to propose a new school and design research institution that could combine an education in design and politics. With funds from the philanthropic foundation that Scholl set up in honour of her brother and sister, who were executed by the Nazis for resistance activities during the war, and support from the American High Command administration of West Germany and numerous industry and European development funds, HfG Ulm commenced in 1953 (Kinross, 1988; Spitz, 1997).

While delivering a university-level education as a private and international college of design, HfG Ulm sat outside of the normal government administration of higher education, which afforded it the capacity to be highly experimental on one hand and on the other limited the transferability of the training in design through a nationally recognized diploma. To deal with this it focused its curriculum heavily on the professionalization of new forms of design practice and built strong relationships with industry, where the Ulm experience would become accepted and valued. Rene Spitz’s (2002) history
of HfG Ulm describes the conditions that led to the development of the school and the challenges it faced as both an ideological project for design research and education, and as a gesture of reform in the aftermath of the horrors produced by National Socialism over the two decades prior. HfG Ulm functioned through a faculty structure that had a small number of continuing permanent academic staff and a large community of guest and visiting staff who would contribute through teaching and research and importantly provide international and professional perspectives on design to its students (Krampen & Hormann, 2003). Eminent guests included Walter Gropius (who had been involved in the development of the school), Charles and Ray Eames, Mies van der Rohe, Hugo Haring, Reyner Banham, Buckminster Fuller, Theodor Heuss, Herbert Bayer, Bruce Archer and many other notable designers and theorists (Spitz, 2002).
Max Bill was appointed the first Rector of the school and implemented a curricular structure that closely resembled that of the Bauhaus (Spitz, 2002). In the first years of operation under Bill the faculty was made up of a large contingent of former Bauhaus professors and graduates, including Johannes Itten, Josef Albers, and Walter Peterhans, who, like many designers, artists and academics of the postwar and divided Germany, were eager to contribute to projects that in some ways repaired cultural and intellectual life and while commencing with just a small cohort, as the school grew it became unusually international.

With the growth of the school a faculty made up of Otl Aicher, Walter Zeischegg, Max Bense, Hans Gugelot, Friedrich Vordemberge-Gildewart, Tomás Maldonado and Gui Bonsiepe and many others brought new ideas for design through its interactions with engineering, sociology, philosophy and psychology that would in time challenge Bill’s concept of the HfG Ulm as a regathering of the Bauhaus and give rise to splits and factions within the faculty (Gay & Samar, 2004). While destabilizing, the tensions of meanings for design that played out at HfG Ulm would arguably produce the most significant shifts of the 20th century toward contemporary notions of industrial design practice, pedagogy and research. Bill and his Bauhaus contemporaries saw design as a largely intuitive practice, in which the designer generated new forms for useful objects through abstraction and experimentation. While Bill adapted this older concept towards an education in design for mass culture, its methods, both for design and for pedagogy, remained rooted in its early 20th century arts traditions. This position was contested by other members of the HfG faculty, including mathematician Horst Rittel and Tomás Maldonado who...
amongst other members of the faculty were active in an emergent field of new theory for design and the need for new ways to design in complex industrial and social contexts (Betts, 1998). Fields such as ergonomics, systems design, semiotics and emerging ideas of the role of design cybernetics challenged the arts and crafts curricular foundation, and Bill resigned as Rector in 1956 and eventually left the school altogether in 1957 (Spitz, 2002).

After Bill’s resignation and a period of management through committees, Argentinian painter and designer Tomás Maldonado took the role of Rector and transformed HfG Ulm through the institution of design consulting projects for corporate clients (Krampen, & Hormann, 2003). Titled Development Groups, these projects allowed faculty and students to collaborate on complex design projects and to test new theories and methods for design. In this period the design contributions to companies including Braun, Lufthansa, Hamburg Rail and many others and the notion of design projected tended towards the systematic or what Maldonado described as early as 1958 as an 'operational science'. Notions of design as a process that could be approached through solely rational means and of the need for some morally formed and intuitive response to design problems would persist, leading to a prolific period of development of a new theoretical landscape for design that included the roots of semiotic inquiry in design, design management, systems design, and what we might now see as early contributions to notions of user-centred design.
No doubt building on the uptake outside of Germany of models of design education developed in the Bauhaus years, the curriculum commenced with a year-long universal preliminary course called the Vorkurs. In the early years of HfG Ulm the Vorkurs tended towards the remedial, and offered students with disrupted prior education a means of reorienting and catching up. Learning in one of these specialist fields culminated in the final fourth year in a self-directed design research project that students would present through a thesis. The fields of specialist study sat within defined departments that were intended to overlap and intersect (Figure 2.2).

Figure 2.2. Diagram interpreting the initial 1951 HfG Ulm training scheme. Adapted from an image from the HfG Archive, Ulm.
In the initial conception of the school the departments were intended to include: Produktform, that focused on Industrial Design for mass-manufactured consumer goods; Stadtbau (Urban Design); Information (Journalism); Architektur (Architecture), that focused on architecture for industrial buildings and the design of prefabricated building components; and Visuelle Comunication (Visual Communication), that focused on typography, graphic design, photography and film. Alongside specialist study, students would undertake courses in philosophy, political science, psychology, sociology, and economics. The actual departmental structure morphed and changed as the school developed and the Produktform and Visuelle Comunication departments tended to dominate. Students in the foundation year were immersed in all manner of subjects, some theoretical, others highly practical, and developed a field of interest through project experiences in specialist areas that would allow them to choose a specialization.
2.4.3 The Politics of Methods for Design

While questions of design as an art or design as a science persisted and kept students and staff thinking through the methodological rigor of the methods they were testing, a common agenda for design underwrote each position. HfG Ulm worked from a concept that as an industrialised society produced and reproduced its own industrial culture through industrial means, all design problems were necessarily problems of industrial design (Buchanan, 2009). With such a view methods for design ought be possible to translate across domains. This concept produced a radical break from the old notions of the industrial designer as an artist who worked solely from the intuition of a situation through explorations in formats of design – drawing and making – as a means of redefining the material and aesthetic characteristics of useful artifacts.

In a context in which distinctions between fields of design were removed through questions of methodology for a new future of design and ideals for the moral position of what design ought to be and do were elevated. HfG Ulm can therefore be seen as an ideological and political project for design for the materializing of a new, democratic and socially responsible industrial culture. Spitz (2002) defines this orientation to design at HfG Ulm as a means of ‘... improving the individual and society as a whole. Design was considered to be a means – essentially pre-political – of accomplishing political goals’ (p. 10). With such a narrative for the purposefulness of design and a multidisciplinary faculty, it is no wonder that debates of methodology would emerge.

Conceived as an experimental school for design, HfG Ulm embraced theory from other fields into its curriculum in ways that design education had never done before. Through teaching and research, and particularly through design consulting work undertaken by the HfG Ulm Development Groups, which
provided a means to rapidly realize new ideas in design through partnerships with large manufacturers and corporations, new ideas for industrial design as a discipline emerged. Central to these ideas were new notions of a scientific or systems approach to both understanding a design as a problem-focused activity and to the generation of design solutions. Through the opening up of industrial design to the broad inclusion of other fields, the HfG Ulm model as it developed actively sought to progress design as a discipline in ways that did not by default rely on old constructs (Weissbourd, 1968). Research into the negotiation of these fields inside design saw HfG Ulm contribute to the growing design methods movements.

However, as a testbed for new methods and theories for design, HfG Ulm was inevitably going to generate its own internal tensions. While Gugelot, Aicher and Maldonado resisted the total push toward analytical methods, other members progressed a scientific and positivistic conception of design method (Spitz, 2015). Attempts to balance these competing meanings through a greater association of particular methods to particular professional domains of design characterized the HfG model from the early 1960s. The ongoing internal academic debates provided the school’s board of governors and the local government with critical ammunition, and as the philanthropic foundation that funded the school grew increasingly in debt, a decision was taken in 1968 to close HfG Ulm and to transition students to other universities to complete their education (Spitz, 2002).

Despite HfG Ulm’s short operational life, it set in motion a relationship to applied and theoretical research concerns for design and particularly for industrial design. The split between new and scientific methods for both doing design and interpreting problems as design problems saw a greater integration of engineering design and scientific processes inside industrial design.
curricula and a de-emphasis of arts and crafts discourses. The recollections of staff and students would build the myth of the Ulm model, and some, such as Klaus Krippendorf’s (2008) reflections on his student experience of Ulm as a young and idealistic mechanical engineer some 50 years later, provide an insight into the collective sense of purpose that the school generated in its students and faculty that belie much of the historical focus on its academic and administrative divisions.

The impact of the Ulm model (as it came to be known) on industrial design curricula and pedagogies rests in the elevation of the design problem as a system of contingent concerns that precede and proceed beyond the activity of design. After Ulm industrial design understood its problems as being at once sociological, methodological and technological, and with that realization came new capacities to consider whole systems through design. Design theorist Richard Buchanan (2009), in reflecting on the contributions of Maldonado and Rittel in particular, describes this as the getting of a critical consciousness for industrial design, in which the social and systemic implications of industrial design as a problem-solving practice for an industrial mass culture really began to take form.

Ulm-styled schools and curricula emerged throughout Europe, the Americas and Japan through interactions between the HfG Ulm faculty and other institutions. In South and Central America in particular the Ulm model was highly influential in the development of new industrial design programs, including the Universidad Autonoma Metropolitana in Mexico City, and the Escola Superior de Desenho in Rio de Janeiro (Bürdek, 2005). Institutions such as the National Institute of Design (NID) in Ahmedabad, which began teaching in 1961, drew heavily on the Ulm model for its product design programs. Founded in response to a commissioned report into the design
needs of India by Charles and Ray Eames published in 1958, NID connections built formative relationships with the industrial design department of HfG Ulm through teaching and research collaborations throughout the 1960s (Ranjan, 2005; De Parker, 2015).
The Second World War disrupted a steady progression of the discipline through education. North American curricula for industrial design moved apace, the British Design Council formed by the Board of Trade in 1944 and reconstituted older models of industrial arts education into programs that focused on newer constructs of industrial design (Dumas, 1996). Like many government-funded institutions in the lead-up to and during World War II, the Melbourne Technical College engaged in specialized training for military personnel and the training of non-military workers for munitions and materiel manufacture as part of the national war effort. By the mid-1940s the Melbourne Technical College had a very strong reputation in the applied and industrial arts and in fields of engineering and was one of the nation’s largest education providers (Murray-Smith & Dare, 1987). Its long focus on applied arts and design was highly regarded, particularly in fields of drawing and ceramics (Edquist & Grierson 2008), and the small course in industrial design started in 1945 slowly developed.

Through the late 1940s Alan Warren (Buckrich, 2007) steered the industrial design course towards a dedicated curriculum, and a full diploma course in industrial design was established by 1949 at the Melbourne Technical College. At its centre was a curriculum focused on practical design for mass manufacture that predated the establishment in 1953 of the influential industrial design curriculum of the HfG Ulm. The comparison to HfG Ulm here is significant as the Ulm model, while only operating until

2.5 Industrial Design Education at the Melbourne Technical College

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8. Edquist and Grierson (2008) provide a valuable survey of RMIT University from its beginning to 2005 through its buildings and the history of their use.
9. Alan Warren would move to Parahan Technical College to head the Art and Design program. Parahan Tech had formed out of a mechanics institute in the 1880’s and had a long history of art and design education. Judith Buckrich (2007) provides a detailed history of Parahan Tech from its very beginnings to its eventual absorption into the new Swinburne University of Technology.
10. The program also resembled in it own local way the then maturing industrial design programs at Carnegie Tech and the Pratt Institute in the United States.
1968 and highly experimental, set in train a pedagogical approach to industrial
design education that, as previously discussed, would be recreated the world
over with precepts left largely untouched in terms of the roles and purpose of
pedagogic instruments and instrumentalities to this day.

Building upon aspects of British, German and North American models of
industrial design education in the postwar period, the Melbourne Technical
College’s industrial design course initially followed a North American
curricular tendency and steered away from a deep inclusion of design as an
overtly theoretical or expressive practice, favouring an orientation towards a
highly practical and hands-on education in design for mass production and the
mass market. It oriented industrial design practice in the established traditions
of creative and stylistic responses to producer requirements and gradually
engaged in the emerging notions of industrial design as a problem-solving
discipline. Problem solving as a discourse for design practice at this time and
in this context is pedagogically significantly and attempted, at least in concept,
to look outside of the immediate needs of a client and the aesthetic preferences
of the designer and to the broader implications of designed things in the world.

Such a progressive curricular preference is, however, unsurprising given the
legacy of prototypical models of industrial arts education that had developed
through earlier schools of design and the working-class technical training
colleges that were established in Australia in the late 19th and early 20th
centuries. While models of education from the DSA were deployed, they were
very often delivered at levels much more advanced than the DSA curriculum
prescribed. Curricular strategies that grew out of the combination of industrial
arts and engineering education provided a particular narrative for the
meanings and application of design in the local context that were progressively
expanded and internationalised through the inclusion of pedagogies from
comparable programs in Europe and North America.
2.5.1 Formgestaltung

Pivotal to the development of industrial design pedagogy at RMIT was Paul Gerard Herbst, who taught industrial design from the early 1950s through to 1976 (Yoxall, 1998). Late in life Herbst would reflect on his experiences as a designer and educator through a book *Formgestaltung at RMIT Australia circa 1960: recollections of a design pedagogy* (2000). Collections of Gerard Herbst’s textiles and graphic design work and items of documentation from his teaching career are held by the Powerhouse Museum in Sydney and at the Ian Potter Centre at the University of Melbourne and at RMIT University Design Archives.

Born in Dresden in 1911, and educated in both industrial and textiles design in Cottbus with a Diploma Industrie und Handelskamer (1931), Herbst spent his early years as a professional designer working in Germany, Hungary and France. After being interned in Germany in the late 1930s, he emigrated to Australia in early 1939 and commenced work as a designer for the Melbourne-based textiles company Prestige Ltd before joining the Australian military and serving until 1945 (McCulloch, & McCulloch, 1994). Following the war Herbst returned to Prestige Ltd as Art Director, a position he would continue in for a decade, and took on other work designing for numerous films and working on various textiles, industrial and graphic design projects. In the early 1950s Herbst was engaged to teach evening classes in industrial design at the Melbourne Technical College, and in the mid-1950s became a part-time employee of the college teaching industrial design in the School of Art (Yoxall, 1998).

In recognition for its contributions through training and technical expertise to the war effort, the Melbourne Technical College was awarded royal

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patronage in 1954 and would for a few years append the Royal designation before changing its name to the Royal Melbourne Institute of Technology in 1960 (Murray-Smith & Dare, 1987). In the same year Herbst became the Principal Lecturer in the Department of Industrial Design (Herbst, 2000), and set about developing and implementing a new and progressive curriculum. Initially titled Formgestaltung, the industrial design diploma program that Herbst devised sought to transition previous models of industrial design education and explicitly positioned the role of the industrial designer as a humanities-trained design generalist with the necessary technical skills to productively engage in the realm of mass manufacturing.

The name of this program (Formgestaltung) was important in that it signalled a very particular way in which the development of industrial design education, and therefore design practice, could be situated within Australia. It carried an emergent and progressive proposition for industrial design. For its time and in the context in which the program was established, it was a bold proposition. It naturally drew upon some of the better aspects of early 20th-century occidental design education in ways similar to the postwar reconstructions of the meanings of design schools such as the New Bauhaus within North America, but did so in ways that elevated notions of responsibility in regards to needless production and consumption. Indeed the very notion of design as a mechanism for activating material consumption, while practically inseparable from discourses of production, was treated quite critically within Herbst’s educational construct, and instead students were engaged in the exploration of form as a creative practice through material experimentation and the public demonstration of design through exhibitions such as Design with Paper, an exhibition of industrial design form studies held at the National Gallery of Victoria in 1970. (12)

12. ‘Design with Paper’ was an exhibition held at National Gallery Victoria, of explorations in paper forms by students and staff of the Industrial Design Department RMIT School of Art and Design from November 10th to January 10th 1970.
2.5.2 An Aesthetic of Scarcity

Due to the comparatively small size, emergent and diverse nature of Australian manufacturing enterprises, a de-emphasis on specialization in particular sectors of manufacturing in industrial design training was seen as critical in equipping designers with the necessarily broad capabilities and cultural awareness to fulfil many organizational roles. The Formgestaltung curriculum recognized that mass production and consumption was central to economic development in the postwar years and that it would occur with or without the involvement of locally trained or practising designers. Teachings that privileged concepts of product ecology, environmental, behavioural and organizational psychology, philosophy, ergonomics and sociology were balanced against production-oriented practical subjects. This curricular mix and the pedagogies and strategies used to impart it aimed at preparing designers with a broad world view and the ability to act as practical advocates for a uniquely Australian ‘scarcity of means’ through design (Herbst, 2000, p.51). This orientation to the discipline saw an elevation of the ideological roles of design over the technical as significant to the ways in which design intersected with local mass production.

Herbst’s aesthetic of scarcity formed as a rhetorical device for the construction of meanings of design practice inside RMIT and declared a particular ideological underpinning for what it meant to be an industrial designer in Australia, in which notions of restraint and resourcefulness and a deepened appreciation of the context of practice intersected with concerns for the negative effects of design-activated material consumption on societies and environments (Herbst, 2000). Perhaps most importantly,
Herbst's prognostication speaks of the need for a culture of design that has the criticality to be what it ought to be, and not to seek to replicate or lionize the practices of its northern counterparts – although invariably it did.
Figure 2.3. Prospectus for the RMIT Industrial Design Course Circa 1960. From the RMIT Industrial Design Program Archive.
Figure 2.3. Prospectus for the RMIT Industrial Design Course Circa 1960. From the RMIT Industrial Design Program Archive.
The ‘Formgestaltung’ title was formally dropped soon after establishment and the program was renamed ‘Industrial Design’ to better align with the now near-universal Anglo-American terminology. The curricular parameters are clearly defined in a prospectus or poster for the program from around 1960 (figure 2.3). The postwar suburbanization and comparative affluence of Australia, and the material and cultural consumption that enabled it, rendered the ideal of scarcity as perhaps a somewhat anachronistic virtue; an unrequited aesthetic for teaching and for designing, or an exercise in designerly irony. Like the notions of social responsibility and critical consciousness elevated through the HfG Ulm, Herbst’s largely un-formalised and prototypical concept of an aesthetic of scarcity, however, hinted at a proposition of industrial design education that looked to actively construct conditions of and for future practice, rather than react to the industrial needs of the day. Indeed even by the early 1960s, the curriculum included progressive combinations of design and theory, including nascent curricula on design for environment, systems design and design psychology (see Figure 2.3). After a quarter of a century of teaching industrial design at RMIT, Gerard Herbst retired in 1976 (Herbst, 2000).
2.6 In the Shadow of Formgestaltung: New Techniques and Changing Priorities for Australian Industrial Design in the University

At this point in the exploration of the development of industrial design as it translated to RMIT University the historiographical method switches to the researchers personal experiences working in the RMIT industrial design, the program archives and the experiences of academic colleagues in the context of research. Throughout the 1980s and 1990s the ways industrial design undertook problem solving, form development, drawing and the very construction of process for design in education were unsettled by new theory and new practices. In Australia, as industrial design education migrated into a rapidly changing university context, new academic strictures and expectations augmented a previous emphasis on design as a primarily a creative disposition enacted through a set of technical skills. The Industrial Design diploma program that Herbst had developed and run for so long was, from 1979, gradually transformed, and in 1982 it became an undergraduate degree program. Central to this transition was engineer and designer Elivio Bonollo, Senior Lecturer in charge of Industrial Design at RMIT. Bonollo would lead industrial design at RMIT until 1989 before departing to develop and head the Centre for Industrial Design at Monash University and the Monash University Industrial Design degree program. (13)

As industrial design education in Australia moved more into the academic space of the university, shifts in theory and practice for design signalled a new phase of the discipline and its education. Emerging discourses of design management, design science, product engineering, design for environment and growing focus on new digital technologies for doing design and for

13. Elivio Bonollo would go on to head the Faculty of the Built Environment (that included Industrial Design) at the University of Canberra
manufacturing challenged the largely intuitive arts-based process of design and the generalist humanities approach to theory in design. New ideas rubbed against older constructs of design and creative and ideologically driven process, and notions of ‘industry’ and ‘relevance’ became more visible in the curriculum. Immediately deployable technical and managerial skills were elevated, but problematized by debates within the growing areas of design for environment, the design methods movements, art and architectural theory. Yet despite this fertile ground for the contestation of new trajectories and new ideologies for industrial design, education in Australia seemed to at once invoke and react against the possibility that design was simply rhetoric in a realised form (Buchanan, 1989).
2.6.1 Changes to the Nature of Industrial Design Work

The growth of Australia’s manufacturing economy in the postwar period began to slow by the mid-1970s, and moved into a gradual state of decline through the 1980s and contract sharply in the economic recession of the early 1990s. With this the profession, and its education incrementally reoriented to be more reactive to the specific organizational needs of the main employers of industrial designers. While new methods for doing design were integrated into local design curricula, they formed more as a means of imparting processes of management than experimentation; this shift towards the immediacy of a vocation in industrial design saw a general reduction in the local need for a broad humanities-based education. A greater curricular focus was given to the development of the technical skillsets desired by local manufacturing industries and the design consulting sector that serviced them. Such a specialization within education was inevitable, and on one hand it significantly refined design capability for specific types of design work, and on the other it reduced the capacity for the mobility of designers between different types of work and the potential of transfer of knowledge from sector to sector.
2.6.2 Changes to the University

With the amalgamation of a variety of smaller vocational education and training providers,\(^{(14)}\) RMIT grew exponentially over the second half of the 20th century (Murray-Smith & Dare. 1987). However, while offering undergraduate and postgraduate award programs and higher degrees by research for many years prior, it was not until 1992 that RMIT was deemed a university by government act\(^{(15)}\). As professional practice in industrial design became more prevalent in Australia, many technology- and arts-oriented Australian universities developed dedicated training in industrial design as either three-year diploma level qualifications to three- or four-year undergraduate degrees\(^{(16)}\). Each program engaged in universal concepts of industrial design practice but defined particular orientations to their local industries, their cohorts and faculty size, and in time their research or industry outreach capacities. In migrating into the university, industrial design educators were faced with the need to actively engage in the full range of academic activities in ways that had been previously marginal. They were forced to teach and to undertake research, and gradually a local research culture developed.

From the mid-1970s until the early 1990s, undergraduate students were funded to study under reforms brought in by the short-lived Whitlam Labor Government (Kaiser, Maassen, Meek, van Vught, de Weert, & Goedegebuure, 2014). A process of enlarging the remit of the university sector in Australia began in the postwar years when it became a prevalent expectation that

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14. MIT absorbed the following design related educational providers: the Melbourne School of Printing and Graphic Arts (1950); the School of Painting, Decorating and Sign Crafts (1965); Preston Institute of Technology (1968); the Melbourne College of Printing and Graphic Arts (1973); Melbourne College of Decoration (1976); Phillip Institute of Technology (1982); and, the Melbourne Institute of Textiles (1985)
15. RMIT was deemed university status in 1992: https://www.rmit.edu.au/about/our-heritage/history-of-rmit/
16. Other Australian universities with undergraduate industrial design programs: the University of Technology Sydney (UTS); the University of New South Wales; The University of South Australia; Swinburne University of Technology; the University of Newcastle (to close in the 1990s and reopen as a one year conversion or extension program for vocational education qualifications in product design); Queensland University of Technology; and, later Monash University, the University of Canberra and the University of Western Sydney.
university education should be accessible to the broadest socio-economic population base possible. This social thinking led to a surge in the size and number of established universities during the 1980s and incremental growth since. By the early 1990s the Australian Higher Education sector had moved (Gale, & Tranter. 2011) to the semi-user-pays Higher Education Contribution Scheme (HECS), in which the federal government contributed approximately half the cost of a local student’s education to the university and the student would pay or be indebted for the balance through the taxation system. However, these changes were only the most visible aspects of the broader changes that occurred in the tertiary education sector toward the turn of the 20th century. Researchers reflecting on these shifts raised questions about changes in society and the economy, redefinitions of the disciplines and the relationships between government and universities (Farnham 1999; Taylor 1999; Alexander & Alexander, 2002). Perhaps most significant was that universities entered into a new phase of needing to be more externally accountable for the qualities of their teaching and research than they had been in the past. Industrial design education, framed on the gathered meanings of the past, found itself inside the organisational complexity and constant change of student needs and administrative functions of the modern university.

As in most contemporary universities, over the past two and half decades students from a wide range of backgrounds have been recruited to study industrial design at RMIT University. A typical cohort comprises mature-age students, international students living in Melbourne, and students who have just completed secondary school. Each of these student groups brings a specific range of expectations, experiences and motivations to their learning and require a different ways in which an engagement in their learning can be effectively supported and evaluated by teachers (Aviles et al 2005, McGlynne, 2005).
In the contemporary higher education landscape, students enter university with expectations that their overall experience will be characterized by good customer service and high-quality facilities and resources (McGlynne, 2005). They perceive themselves to be paying clients and expect particular qualities of service and an academic outcome which will enable them to gain employment.

In most design disciplines, teaching and learning is done in a project-based learning model often referred to as a studio model. In Industrial Design the studio model typically combines activities of design and design thinking, research and the synthesis of design concepts as responses to a design problem through the generation of visualisations, technical documentation and prototypes. The studio model and its intersections with theoretical and practical learning possess many qualities and practices that support good learning and sit as a cornerstone practice of design education. However, with the transference of industrial design from technical colleges into universities, industrial design education produced its own local peculiarities of which I have experiences of as a student and an educator. Curricula developed from selective combinations of European, British and American constructs tended to rely heavily on the continual presence of students in the studio and the fabrication workshop as the primary means by which capacities in practice would be attained. Time and space in the modern university are progressively constrained, and the ability for design education to maintain older notions of ‘the design school’ became operationally difficult. For instance, while notions of the fabrication workshop and prototyping within the studio were important in Australian industrial design curricula, to maintain them as intensive sites for teaching and learning in a changing institutional context requires a very active utilisation and they became uniquely privileged. Thus, concepts of the centrality of the workshop and machine use as a curriculum
instrument became in the local context tacitly positioned as the point at which the robustness of design concepts was fully tested and reflected on through acts of making and manufacture.

As the studio model of teaching and learning often privileges the knowledge, experience and practice of the lecturer over that of students, there are aspects of the model that can lead to repressive and controlling behaviours by teachers (Yanar, 2001). As simulations of professional practice design studios often have very high workloads and, due to the emergent nature of learning design through designing, can have equally high levels of ambiguity. Consequently design studios can produce a culture of a fear of failure, mistrust and anxiety, and can unwittingly create stressful conditions for students, which therefore result in sub-optimal learning experiences (Biggs, 1999). Such situations usually lead to ‘strategic learning’ tendencies in students, meaning they become adept at analysing the expectations of their teacher and learning ways to meet those expectations (Biggs, 1999; Davies, 1997; Jackson, 1995). While strategic learning very often limits deep learning, it is also recognised that it is a necessary and natural process of learning (Varadarajan, Fennessy & McLean 2007).
2.7 Refiguring the Design Process

During the 1960s and 1970s industrial design theory became increasingly preoccupied with the interactions between the design process and the optimisation of design outcomes for both the quality of human associations with a product and the efficacy of the design process through its production and commercial stages. Sydney A. Gregory’s *The Design Method* (1966), Herbert Simons’ *Sciences of the Artificial* (1969) and Christopher John Jones’s *Design Methods: Seeds of Human Futures* (1970), to name but a few, set out new discourses for managing and conceptualising a systematic process of design. The developments of theories of systems and semiotics from HfG Ulm, and particularly through the work of Horst Rittel, produced a theoretical and methodological landscape that, given the complexities of design problem solving and planning within the socio-technical systems of mass culture, saw that design could only ever produce near-satisfactory outcomes. Through a series of writings (Rittel, 1972a; 1972b; 1973; 1988) over many years, Rittel framed the nature of problems for design and planning as being either determinate or ‘wicked’ and indeterminate. The following paragraphs summarise the various elements of the nature of wicked problems.
2.7.1.1 Wicked Problems

For simple or determinate problems of design, such as incrementally restyling an existing product, the process of defining a solution is largely pre-evident by virtue of the problem arising and being identified. Solutions to such problems may result in better or preferred outcomes relative to the definition of the problem but are unlikely to offer innovations. Where innovation is desired or required, simple problems may need to be considered wicked problems in order to move beyond the extant nature or representation of the problem and into the system of problems that surround it. Problem definition is inherently subjective and perceived from the gazes of the problem solver and those that are stakeholders in the problem.
2.7.1.2 Collaboration in the Problem Space

As wicked problems are multivariable and indicative of other problems, their inherent complexity, both in terms of how they are defined and how they might be resolved, requires a collaborative approach. If the definition of a problem cannot be arrived at, it thus comes to constitute a type of wicked problem. This might occur when there is an inability for different stakeholders in a problem space being able to reach a practicable consensus on the particularities of it as the problem. If a problem cannot be defined it cannot be solved, but as an indeterminate problem it can be tamed or reframed. In the collaboration towards defining and resolving a wicked problem, stakeholders and collaborators enter into the sociality of the problem. All stakeholders and designers in a process of problems solving are potentially equally knowledgeable. This requires communication, deliberation, argumentation and consensus on particular goals and steps to achieve an adequate resolution to a problem. As the process by which the problem is defined similarly defines its resolution, the problem solver(s) cannot be ‘wrong’, only ‘responsible for their actions’ (Rittel, 1972b, p. 393).
As working on wicked problems requires both a science-like analysis of a given problem and its context as well as an envisioning of what the solution might be and how it might change the original context of the problem, it necessarily requires an argumentation between science and design towards a process of planning. Given all wicked problems are unique, there is no definitive way of formulating them as problems and no set number of possible solutions. The process of representing the problem as ‘wicked’ ascribes the nature of its resolution. As such, indeterminate problems have no clear end (Rittel, 1972b).

Rittel’s concept of wicked problems became critically important in the Design Methods movement and Design Science field, but it was seen as problematic from inside other circles of design theory. Buchanan would later describe this problem as being that ‘the wicked-problems approach has remained only a description of the social reality of designing rather than the beginnings of a well-grounded theory of design’ (1992, p. 16).

The contestations of the Design Methods movement (Cross, 1984) took industrial design deep into the theorizing of its practice and rattled notions of what in designer parlance was called ‘the design process’, which had become orthodoxy for design through education. The problematizing of the design process would play out through various factions and challenge the nature of industrial design curriculums; fields of methodological certainty for design were let go of and new fields adopted. Theoretical areas of the 20th century curricula, such as ergonomics and other areas useful in the generation of forms and interfaces in product design, were mutated by an enlarged field of human factors that began to account for the sociological dimensions of materially mediated practices and a growing discourse on design cognition.
and product semantics (Krippendorff, 1989). Changes in the ways industrial designers worked were from the late 1980s dramatically altered through the use of Computer Aided Design and particularly 3D Solid and Parametric Modelling software systems. As these technologies moved from the highly specialised stages of product engineering and began to filter through to the earlier stages of design and into education, many of the curricular orthodoxies around the role of technical design drawing developed through education for professional application were challenged and similarly let go. New ways of working required new models of management, and spheres of industrial design research interested in how the design process might be best deployed in organisational settings developed into its own field of design management, in which concepts from the design methods movements were merged with management theory. Concerns about how industrial design participates in the generation of environmental problems through useless and fast-moving consumer goods made popular in the 1970s by Victor Papanek moved from being moral imperatives for design to fully fledged methods for design with the eco-redesign movement of the 1990s to which the Centre for Design at RMIT University was a major contributor. These methods formed within a growing field of theory called Design for Environment (DFE) that challenged industrial design to work from an evidence base when designing in order to fully account for the negative environmental effects of a product’s manufacture, use and end of life.

Yet despite this fervency around what the design process might actually be and how it might be explored, the use of design methods towards optimisation—technical, social or environmental—in industrial design education for design practice was, even by the first years of the 21st century, quite scarce (Bonollo & Green, 2004; Ramirez, 2006).

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17. The Contribution to fields of Eco Design, Design for Environment (DFE) and Design for Sustainability (DfS) are discussed in detail in following chapters.
2.7.1.4 Reconciling the Design Process

In 1992 Richard Buchanan wrote an article published in the journal Design Issues that was important for the ways in which industrial design education might consider both the historical development of design methods and the arts/science split in relationship to what designers actually do in practice. Titled ‘Wicked Problems in Design Thinking’, it would later be republished in the anthology Design Ideas (Buchanan & Margolin, 1996). In attempting to reconcile decades of argument over design theorising on design as a process of solving or acting on determinate problems, and ways of designing in the ‘wicked’, ill-defined and indeterminate problems that Rittel described, Buchanan turned back to Dewey’s theory of technology and settled on a rather open definition of design as an ‘art of experimental thinking’ (Buchanan, 1995, p. 5). Given design gets applied to such a diversity of human, technical, perceptual and contextual issues, Buchanan resolves that linear or determinate design methods as processes of planning and problem solving are only useful up to a point. In the indeterminate problem situations that designers confront, the design process moves through basic or prototypical solutions or visions for what might be and then into the ‘actual practice’ where design process generates ‘quasi-subject matter’ to be figured against actual circumstances (Buchanan, 1995, p. 16). Buchanan’s intervention led towards a prospect that no matter how the design process is defined within the practice of design, the process is not the subject of design. As designers encounter all kinds of problems through all kinds of perspectives, method is and must be adaptive and open. In response to the question as to why design problems are indeterminate or ‘wicked problems’ Buchanan offers this:
Design problems are ‘indeterminate’ and ‘wicked’ because design has no special subject matter of its own apart from what a designer conceives it to be. The subject matter of design is potentially universal in scope, because design thinking may be applied to any area of human experience. But in the process of application, the designer must discover or invent a particular subject out of the problems and issues of specific circumstances. (Buchanan, 1995, p. 15)

The systemic dimensions of design, and the process of designing in and for social systems, requires in Béla H. Bánáthy’s view methods of design problem solving distinct from those that sought an optimisation of design processes. In his comprehensive Designing Social Systems in a Changing World (1996), he examined various positions from the disciplines that ‘design’ so as to think through how design really operates in the complexity of a system. Design analyses existing or evident problems in a social situation or system in the ways that might be done through science-based models of problem identification and problem solving. However, as a field design is primarily concerned with what the system ought be and how it ought function, and what possibilities might be envisioned for it to function in such a way. The impacts of design are only made manifest through the collectivised actions of all actors (human and non-human) in a social system over time, and unlike processes of planning, design is concerned with the model of the social system and its preferred future states rather than the planned steps that might be needed to achieve it. For Bánáthy, problems for design are, as a function of being at once in, between and in view of changing social systems, never isolated and always systemic. As such problem situations consist of ‘…a system of problems rather than a collection of problems” (p. 29). As problems in design are only sometimes clear and are more generally ill-defined, unstructured and
contingent on the social systems from which they emerge, design carries the ability to arrive at solutions (or approaches) from outside of the given social system. Design process is therefore not terribly concerned with systematic outcomes and progress is made visible through a ‘dynamic interaction between feedback and feed forward, reflection and creation, and divergence and convergence’ (Bánáth, 1996, p. 17).

The fixation on the rather slippery subject of design processes and methods of doing design had in many ways led to an intra-disciplinary slide. The cultural effects and the meanings of design in the world were produced regardless of the process of design and by the very social and technical systems that design theory so earnestly tried to make systematic. This looking in on the methods of design was reflected in the ways a forming discipline of Design History engaged in its own contestations of meaning construction for design. As the Design Methods movement began to realise that it, in looking to optimise or find means towards certainty in the seemingly intuitive nature of design, had sidestepped the truth that for the practice of design the process was not the subject, the growing field of Design History produced similar reactions(18).

With historiographical methods drawn from fine arts and architectural history, Design History produced all sorts of claims of the purpose and rationale for design from outside of design (Dilnot, 1989). Tony Fry (1998), in drawing attention to the Euro-American centrism of the developing Design History genre and how design history might be best understood in the Australian context, wrote:

18. Design History claimed itself a 'field' in the 1980s, which led to a long academic debate played out through the Journal of Design History, Design Studies and Design Issues.
Design History is understood here as various and competing explanatory models of design. As with other emergent and established forms of institutionalised knowledge and practice, it exists in and produces conditions of marginality. (Fry, 1989, p. 15)

In stating what for industrial design was already known, Fry represents the local condition as a borrowed history that is marginal but that provides meaning nonetheless. Meanings of practice and place that had been:

….historically constituted by the processes of import as a diverse and nuanced range of social appearances. This can be regarded as a materialized bricolage formed from eclectic patterns of objects of immigration and appropriation, drawn from the forms of a modern world elsewhere. […] Australia is the land of simulacrum, a place of original copies and unplaceable familiarity. (Fry, 1989, p. 18)

However, just as the outputs of industrial design can be seen as part-contributors to the postmodern condition through the last decades of the 20th century, the gradual commodification of design as both a process and a value was itself evidence of its own state of Baudrillardian third-level simulacra (Hegarty, 2004), a realisation that through the postmodern a post-industrial condition was already apparent. In the absence of a singular or clear ideological agenda for design practice, such as that of the neo-positivisms of HfG Ulm or the utopian ideals of the Bauhaus, the century closed with a student cohort and a generation of designers that had too many methods and too many meanings of practice to use. Instead they sunk themselves in the bulletin boards of the early Internet days and saw new and immaterial futures for industrial design; built, floated and rendered objects in digital space; were paralysed from industrial design practice through readings of Viktor Papanek,
but did it anyway; were encouraged by, but perhaps didn’t quite understand
the brilliant ironic arrogance and anarchy of Philippe Stark or the austerity of
Richard Sapper and the reduced and ahistorical aesthetics of Dieter Rams, but
looked at it as from the past; or, perhaps resigned themselves to reiterations of
the same, just as Luce Irigaray said; or through skeuomorphic strategies only
to be later vindicated by Apple, the reissue of new versions of old Volkswagens
and Minis, and the use of ‘Eames Era’ (19) descriptors for furniture bought and
sold online.

However, these expanded meanings of theory for the practice of design,
broad as they were, opened up the remit of applications for industrial design
as an analytical, creative and morally directed practice in the new millennium
and gradually filtered through to education. Internationally and locally, many
industrial design programs changed to focus on either specialist fields or
attempted to maintain a generalist approach to design. For instance, by 2004
the Industrial Design program at RMIT University that I base my academic
career in was transitioned into a four-year Bachelor of Design (Industrial
Design) and in order to maintain, or perhaps reinstate, a generalist approach to
industrial design, a very particular curricular structure developed.

Within a school of Architecture and Design, the program structured itself
around a model in which half of a student’s total study load was dedicated to
applied design studio projects and the other half dedicated to theoretical and
technical subjects. Within the design studio, the kinds of projects that were
permitted were opened out to allow students, academic staff and industry-
based teachers to play with new and old meanings of industrial design through
the integration of students into the research and practice domains of their
teachers. As a result approaches to teaching, learning and doing design

19. ‘Eames Era’ is a catch-all colloquialism for mid-20th-century-styled designer interior products made popular
through eBay. It has no bearing on whether a particular product was designed by Charles and Ray Eames, or even if
it was produced in the mid-20th century.
were significantly diversified, with each studio essentially operating as its own enterprise, and each with its own theoretical and practical parameters. Studio projects were revised every semester and students were given the opportunity to both elect which studio they would take from a suite of offerings and importantly, to define for themselves what kinds of projects they might undertake within the enterprise. Given the risks of such an open structure to the acquisition of appropriate disciplinary knowledge, skills and behaviours each studio, and each teacher, had to define up front to students its methods of approach to design, the contextual locations for the use of such methods and the relevance of such approaches to future practice. Meanings of industrial design in this curricula construct were in effect enabled to be both inclusive and transgressive, in that industrial design was defined by what industrial designers actually do in the contemporary context, what they concern themselves with and how they approach those concerns through design.

History, or the selective making of history such as that in this chapter and the last, sets a scene – a gathering of concepts – from which ideas of industrial design in education can be tested and reflected. The following chapters present a series of case studies undertaken as fieldwork in teaching in the Industrial Design program at RMIT University to reflect on pedagogic concepts and tactics tested within the curricular structure outlined above. As this is a specific site of research, the reflections of teaching and the processes of modelling used to apprehend and frame pedagogical positions can only serve as evidence of the particularities of my approach and the context in which the fieldwork was undertaken. However, in doing so it offers a particular scholarship of teaching in a changing disciplinary domain.
Imagine all that is going on around you, all those struggles
Picturing them just like historical incidents
For this is how you should go on to portray them on the stage:
The fight for a job, sweet and bitter conversations
Between the man and [his] woman, arguments about books
Resignation and revolt, attempt and failure
All these you will go on to portray as historical incidents.
(Even what is happening here, at this moment, with us, is something you
Can regard as a picture in this way).

Bertolt Brecht, Fragments of Speech to Danish working-class actors on the art
of observation (1938. Pp.233-38)

When teaching, the pedagoge performs a selective process of marking
out the development of conditions of disciplinary practice through moments
that accord to, or offer possible rupture of, the concerns of learning: redacting,
embellishing, qualifying and contextualizing. As such, the theorizing of
pedagogy as an activity enacted through practice necessarily entails a process
of historicism and historiography. An aesthetic device for the locating and
conveying of performances, historiography sets up conditions under which
learners can ascribe meaning and undertake the construction of new meanings
for their own notions of practice. The pedagogue, when teaching, is always
positioning; making moves as part of the public performance of teaching their
discipline. These moves serve to make manifest the historical as a drama for the
present and future. Both the learning and the teaching of a particular practice (a discipline) thus require a habitation of notions of historical – of the ideals and the ways of the practice. Disciplinarity is made possible through a witnessing and emulating of these historically defined and performed strategies to afford a habitation of new meanings for practice. The historical therefore operates for pedagogy in three ways: as a narrative device for structuring the portrayal of a situation; as a means of elevating the quotidian as significant; and, as way of visualizing, or scripting, the performativity of the present.

Throughout the development of industrial design education and its transition from manufactories and early schools of design to technical institutes and finally to universities, a series of pedagogical elements has developed and been transmitted. These include formal and collective education as sites for the simulation of professional practice; a distinct set of signature pedagogies to structure disciplinary learning; pedagogy as a means of scripting of practice identities; and, pedagogy as a vehicle of disciplinary adaptation to changing methods and contexts of practice. Each of these elements constitutes its own form of orthodoxy within the discipline and produces particular archetypes of teaching and learning performance. This chapter explores these notions and introduces a series of pedagogic concepts developed through various instances of teaching in industrial design as a form of fieldwork. The concept of industrial design pedagogy depicted in the previous chapters is opened out to elucidate its tactics in this and the following chapters. This provides a scaffold onto which reflections of teaching contained as case studies can be hung with reference to the work of others over time in the discipline, and the inter-contingency with its educational institutions, their orthodoxies, and the performance archetypes that they have produced. In making these descriptions and relating them to current conditions there are
hints of the issues of power and subject that reside in such performances; not in an overt way, but rather to frame these issues for the purposes of grounding pedagogical positions: to see what sits beneath the work that industrial design educators do. This is done in order to provide a critical account of the discipline’s signature pedagogies and sites of learning, as exemplified in the common and near-universal strategies of teaching and learning design through stylized encounters and simulations of designing as if in actual practice.

Through education, particular disciplinary identities are scripted that are specific to the contextual circumstances of the institution in which teaching and learning is done. The case studies discussed in this thesis were all undertaken as teaching projects within the industrial design program at RMIT University, and so perhaps only represent the particular affordances and limits to practice of that institution. Within this context of practice the role of subjects, themes and topics for industrial design education are opened out as materials for curriculum design and described through selected case studies of the researcher’s pedagogic practices. Cultural-Historical Activity Theory is used as a means of unpacking the particularities of subjects, themes and topics inside industrial design pedagogy and leads towards the description of a typology for industrial design studio-based learning construction that revolves around different combinations of methodological and contextual concern for design conveyed through the structuring of various fictitious and authentic learning immersions. The chapter closes by discussing the function of design teaching and its strategies and structures as a means of disciplinary adaptation and transformation.
3.1 Working with the Ghosts of Practice

When made memorable, pedagogic performances are inscribed in the gathering of disciplinary meanings by learners, alongside the particular values and methodological orientations that are privileged, or made problematic, within the parameters of a project or a problem or a topic of enquiry. In education this is how disciplines are made and remade. When reflecting on practice, the pedagogue is similarly constructing through a process of historiography, drawing together the ways in which activities of a discipline and the surrounding social-economic-institutional-technical systems might be made into meanings for practice. This ‘making’ of histories takes place through a continual framing and re-framing of narratives of disciplinary condition within the educational exchange, and becomes for pedagogy a palimpsest: an active ghosting – a tracing – of the usefulness or otherwise of past meanings, and of the associated and outsider practices that are carried through teaching and learning and through the structure of curricula. Seen from this angle pedagogy is rendered by, and actively re-rendering, the dimensions and implications of disciplinary technique and tactic. Pedagogy is at once of the self, of the teaching, of the learner, of the place and moment, and of the discipline: always and already ontological, situated and socially constructed. Pedagogy thus viewed is a process of the making and re-making of practice identities.

History, positioned as a device for meaning construction inside education, provides a way to explore how industrial design as a discipline of materially mediated invention, and of task and status making, produces and maintains for itself particular conditions for practice and particular boundaries of disciplinary concern. Such a device allows a weaving of a genealogy of industrial design so that it becomes possible to connect together the various
states of meaning for designing and the socio-economic-political-institutional circumstances into which the identities of designers are developed and maintained, a phenomenon that perhaps lingers within all pedagogic frameworks. As such, the historiography presented in this work offers a particular narrative of the ways in which the ‘becoming’ of industrial design has been and is facilitated in the educational context, and attempts to speak of the negotiation of a series of inter-dependent factors that script particular ways of being for designers.

This kind of historical work, however, has a different ambition to ‘normal’ historical work in design. Conventional or ‘design’ histories of industrial design tend to locate the object designed or the uniqueness of a particular practice of a designer – as inventor, artist or advocate – at the centre of its historiographical method. Similarly, the histories of design often taught to aspiring designers centre on histories of the ‘thing’, the ‘movement’ or the stylistic elements that might be read from an object in relation to the ever-shifting conventions of art, technology or architecture over time. Sometimes these are bound up as micro-histories of the technical, or of the designed artefact, or the heroism of the individual designer or collective under creative challenge. Often told through the material-culture narratives of designed objects, or the relentless pursuit by a designer of technological or aesthetic advancement, the design process in such historical constructions are very often conveyed as leading to fundamental redefinitions of meanings of design practice. ‘Thing histories’ of industrial design seek to make claim of the thing of a discipline through its things, and take various forms: of the creative and entrepreneurial; of predominantly male designers that bring new cultural meanings into the world; and, of the companies that are prepared to take a risk on their continuous contestation of ideas of ‘good design’. Thing
histories often account for design acts, and the enterprises that enable them are in some ways ‘giving’ to their societies through some inherent altruism of design thinking and action. ‘Altruisms’ can be read as a concern of the aesthetics or the reformation of a particular epoch, or as an underlying discourse that necessarily arises in the work of creating things of value through acts of designing. However selective, such historical work is of course useful in understanding the roles played out by design in society and the possibilities and implications of creativity through design on changing notions of production and consumption as practices of culture, but it constitutes a different kind of history making. Histories of design education, on the other hand, tell a different story: of incrementalism and the incursion of the profession and the institution into the space of learning, and of a continual appropriation of methods and meanings from the past.

History for industrial design is here construed as a particular epistemological frame for education and for practice, in which design for future conditions is figured from known and assumed precedents. To see the ways in which design practice is undertaken, the process of picking apart the ways of organizing an education in designing forms a particular mode of historiography as a reading in and of action. In this vein the genealogies of industrial design education discussed can be understood as being broadly ascribed to institutional interactions through shared, co-opted or contextually differentiated curricula. However, it is the histories of the applied and inherently practical nature of industrial design in practice that so marks the commonality of curricula over time – an ephemeral history, of speaking while doing and making.

In part scripted through the historicisation of the idealisms that are
generated and activated by its pedagogues, their institutions and their rhetoric, often these histories overstate the interdisciplinary and integrative nature of industrial design in formal education. Often the source material from which historians of design construct their narratives are gathered from a distance, either though the passing of time or from the selective recounting of the influence of the designer-educator by ex-students. Often, and particularly in the early and mid-20th century, the accounts of design education as sites of meaning construction stem from the reflections of teachers themselves; induced by the relocation of locales of practice as a result of the turbulence and dislocation of war, immigration, economic opportunity and political orientation. Such reflections redact and amplify, and some cases romanticize, meanings of practice encountered in the context of education through omissions of the doing of design and design education as a commercial activity in daily life. Very often they carry noticeable omissions: of the marginal, of women, of the mediocre, and of their failures. These histories similarly construe a picture of the design institution as an inherently progressive and responsive entity: steering the social, material and technological discourses of design through the products, services and processes that students and faculty produce. Through this the idea of the ‘design school’ is rendered a site of disciplinary foment or fortitude, and as a location in which political ideals – such as the idea of improving societies through material and technological goods – are afforded space to be realized.

Meanings at the level of teaching and learning are similarly shifted through these historicisations of practice. For instance, the ‘studio’ shifts from being a place of work to a place of ideological agitation through creative practice, to a place of organized learning and then to being a contemplative site of negotiating the social and technical. The museum as a cornerstone of early
design education over time has been reconfigured as a location for meaning construction through the elevation of exhibition, the shop, the magazine and then the internet. In much the same way the idea of the design school moves from being an instrument of economic and political imperatives to an idealized location for creative practice, and becomes a site for larger negotiations of the ‘right ways’ for design. Meanings of design in fields of theory get similarly transfigured through historicisation: design as an art; design as a science; design as politics, and design as technical education. Just as the role of the industrial designer has shifted over time in response to industrial, consumer and technological change, the discourses with which the discipline has ascribed value to practice have similarly moved.

Design thus promulgates itself through a deliberative and often self-serving rhetoric, that through words and artefacts supply teaching and designing with motivations for continual experimentations and transgressions into the orthodoxies of doing design. An interrogation of the historicisation that so much of design thinking is spoken through reveals the post-rationalized and the fairly arbitrary nature of histories made out of a recounting of design. But however inadequate or deterministic, such histories are in the action of teaching and learning; offering inspirations for form or material discourses, or idealisms or the kinds of heuristics that might emerge for learning. Acts of history construction in teaching are critical in both the locating of pedagogic practice and in the structuring of the getting of disciplinary identities for learners. When opened out, the transitions and implications of past practices, or how those histories might effectuate future practice, bring forth a way of positioning meanings of design as inherently mobile and contestable things. These are not the histories that come via the texts of design, nor art or architectural historians, but the histories that come directly from practice and from the
practitioner as teacher: through anecdotes, examples, stories and reflections.

History as a constructive process examines ideals, attempts and failures, and the moments when the social, technological and institutional dimensions of a problem or opportunities for change through design align or misalign. It deals with strategies of activating in a society new forms of labour and technique for the transmission of designed goods into the world, and for generating new – or maintaining existing – socio-technical practices in the functioning of designed things in the lives of people. Ideals of social reform in design, or perhaps more accurately the project of equipping designers with the agency to pursue social reform agendas, have lurked within formal industrial design education since its very beginnings, as a companion strategy to reforming the negative social implications of industrialization, and to the modernization of craft-based vocations. Industrial design education as a part-player in economic reform is a similarly entrenched ideal, where the capacity for value adding to serially manufactured goods and the systems of exchange that surround them at either end of the production-distribution-use spectrum is enabled by design. Both the social and the economic sit as implicit agendas in this history and are produced by a particular pedagogic genealogy. Historiography for the design educator, whether conscious or not, functions as the mechanism by which notions of practice are carried, re-made and transferred. Itself a construction, for the purposes of the researcher’s own practice in an explication of a particular vision of industrial design education, it risks the same faults of amplification and rhetoric as any construction of meaning. Historiography, despite its amplifications and exclusions, constitutes a particular, and pivotal performance of and for pedagogy.
3.2 Sites for Working and Sites of Learning: Pedagogic Locations for the Simulation of Professional Practice

Industrial design has, since its inception, placed significant emphasis on the simulation and sites of professional practice to structure education. Particular notions of the atelier, the fabrication workshop, the studio and the museum as pedagogic devices have developed, changed and been maintained and serve to locate particular performances and disciplinary meanings. Given the historical craft and manufacturing dimensions of industrial design, it is perhaps inevitable that sites that focus on material production of different kinds carry such significance in its education. The museum, the workshop, the atelier and the studio each in their own ways afford different kinds of learning through doing that are useful to explore in the task of tracing the underlying structures of industrial design pedagogies and the practice identities that are generated through them. Each shares meanings with disciplines and activities that industrial design has been closely associated with through its educational manifestations and through professional practice. It is important to note, however, that these sites are not necessarily different physical locations, but rather orientations to different kinds of activity for design and are generally utilized in concert. In this way each pedagogic location is contingent on the other, and each provides different values to the development of professional practice.
The museum as a pedagogic strategy for industrial design is a reoccurring thread. With the first prototypical design curricula, industrial and technological artefacts sat as references and inspirations for exercising and developing the tools, rules and roles that industrial designers would deploy on a new age of machine-made and serially produced goods. Historical examples such as the museum collections that were appended to the central London Schools of Design (now in the Victoria and Albert Museum), and Melbourne’s Industrial and Technological Museum (split between several newly formed institutions in the late 19th century including the Working Mens’ College, now RMIT University), saw the proximity of a collection of artifacts as pivotal to learning design. While initially functioning as a device for reference, drawing and case studies in form, materials and manufacture, the place of the ‘museum’ in the curriculum remains, despite many of its original functions being replaced by other media for information and reference gathering.

In the 20th century the centrality of the museum to design education was altered by the proliferation of print media, exhibitions and books, which could bring new ideas for design at a speed and volume that a hard material collection in a museum could never achieve. Changing notions of the shop and showroom, where brand-new products and new technologies could be readily accessed, further augmented the role of the museum. With these shifts, and the exponential ease with which learners can now access reference material, notions of the museum in the curriculum took its own turns. Since the mid-1800s designed goods being collected by and seen inside museums and galleries ascribed significance to the very location as an outlet for designers to direct their activities. This has produced a particular characteristic for certain
spheres of industrial design practice, where the role of the museum became, for some fields of design and manufacture, and particularly those that dealt with luxury or expensive goods, a strategy for ascribing higher design value to products. For instance, automotive companies and corporations such as Alessi, Apple, and Nike, alongside many others, have all developed and maintained quite sophisticated museum-style narratives to elevate perceptions of the value of their goods.

While the museum has become a location for design, other notions of the museum in education continue. Techniques such as ‘product autopsies’ use artefacts as models to analyse the manufacturing and environmental aspects of a product. In fact, the use of an existing artefact as an article to commence research activities is perhaps as important in industrial design education now as it ever has been, in that understandings of the technology, culture, context and politics that surround it critically inform the design of new things. In this way the historical artefact operates as a window into the possibilities of change.
3.2.2 The Workshop

While technically oriented the workshop occupies a location for industrial design that is extremely exploratory, where the designer tests the parameters of material, tools and machines in order to think through design problems in highly practical ways. Within a workshop environment designers interact with various trades and develop appreciations for the complexities of manufacturing and the physical and aesthetic nature of material things. The workshop as a site of technical work that was adjunct to the studio harks back to William Dyce and his British Schools of Design contemporaries and their neo-medieval elevation of making and crafting as the pinnacle of technical studies in industrial design (Burton, 1999). As a location for teaching and learning in industrial design, the workshop was significantly advanced through the Bauhaus (Bergdoll & Dickerman, 2009) and in its first few years reiterated a notion of hand making in much the same way as Dyce had seventy years earlier. The workshop inside contemporary industrial design curricula remains a major component of student life and is very often a highly social and incredibly productive site for self-directed learning. As fabrication technologies have developed, workshops serve as both a place where students can be introduced to the fundamental aspects of making and as location for the exploration of emerging techniques.
3.2.3 The Atelier and Pseudo-atelier

The atelier revolves around an experienced designer or artisan inducting and directing novice designers into meanings of materially oriented design practice through a close working relationship. The commercial and operational parameters and the often highly specific modes of production of an atelier when fitted to formal education reveal tensions when figured against a generalist technical education in industrial design. However, understanding the atelier as a product of informal histories of design education provides a means by which its significance can be interrogated. In industrial design curricula the transition of romantic ideas of the atelier to a practicable approach for teaching and learning can be seen as a form of pseudo-atelier. Common from the arts and crafts periods in design and used commonly right through to the 20th century, the pseudo-atelier centres its pedagogical elements through a form of project-based design studio simulation. Teaching strategies such as the use of the project and the critique act to retain the power relationship between teacher as master and student as novice. The pseudo-atelier model is predicated on three dominant learner traits: aspiration, reverence and compliance. Aspiration manifests as a shared sense of collective purpose between learners as a means by which professional identities can be attained. Reverence exhibits as a sense of belief in the mastery of knowledge and capabilities of their teacher. Compliance sits as a willingness of learners to submit to and follow instruction.

The atelier as an actual model in professional practice is of course quite different from how it often plays out in an educational context. The commercial and creative production dimensions of an atelier as an enterprise demands activities that are difficult to facilitate in formal industrial design education.
located within a user-pays university context. Similarly, the transition of industrial design curricula into university contexts that privilege research and learner-centeredness, and away from the often romanticized and historically reconstructed ideas of a design school, mean that the use of an pseudo-atelier model is difficult to justify. However, while altered by the changing institutional requirements of higher education, the atelier model and its embedded positioning of the design educator as ‘master’ remains a tacit pedagogic ideal for many designer teachers.
3.2.4 The Studio

Over the past few decades the pseudo-atelier as an organizing structure for industrial design pedagogy has morphed into broader interpretations of the design studio in which students encounter contemporary notions of design through a diverse set of experiences. The design studio functions as a means by which students can be gathered around a project for a defined period of time in order to iteratively respond to a set problem, opportunity or practice. The design studio is both a location for learning and a system through which aspirant designers can be exposed to a wide variety of subjects and techniques. While the design studio is an approximation of professional practice, it should be made clear that the nature of the design studio common in educational contexts is vastly different from its diverse nature within the professional practices of industrial design and its associated fields. With the possible exception of fine arts education, the studio in the educational space rarely simulates the totality of professional activity. It is perhaps more accurately described as a site for engaging in discrete and iterative instances of project-based learning, that, over the duration of a student’s total education, and through the use of a set of conventions or signature pedagogies, are reflected upon and reformed as a coherent set of disciplinary values and capabilities.

Design studios operate through a series of implicit expectations of the learner. These expectations include that the learner can in some way demonstrate, mediate and rationalize issues of production, material, utility, economic and stylistic values within a design response to a problem. There is an emphasis placed on the execution of a wide range of media and communication skills as the means by which responses can be transmitted. Finally there is an implicit expectation that through ‘practice’ a material
artefact response will avail itself and be representative, through methods of inference, of the learning that has occurred and demonstrative of the learner’s capacity to practice.

This model uses design activity as a means of negotiating a set of ill-defined problems and opportunities as interventions located within a specific context of need. Learning and teaching is almost entirely constituted by informal theoretical knowledge construction acquired through a stylized simulation of professional practice. The technical and tactical elements required to conduct and deliver a project are generally demonstrated or described in abstract terms by the teacher and left to the learner to ‘practice’. Learners use these tactics and technical practices to think through a creative and appropriate response to the problems of the project, but are often not explicitly taught to think in designerly ways. This capacity is left in the domain of the learner and then appraised through a critique of both the learner’s design outputs and navigation of the project as a whole.

The design studio model, while important in industrial design education, is not in itself wholly representative of the entirety of the educational engagement that design educators or learners experience. Industrial design curricula generally contain history and theory courses, communication- and visualization-oriented courses, and technology and manufacturing engineering-oriented courses that serve the practical and methodological needs of design studio projects. As an approximation of practice design, studios are in and of themselves not really a reliable method of simulating the variance of professional practice. However, once seen from beyond the notion of simulation as some kind of near-authentic immersion into professional practice, the shared pedagogical and disciplinary elements of studio-based learning begin to emerge: teamwork, reflective action research, action learning,
socio-material thinking, iterative discovery and the demonstration of learning through multiple media.

The comprehensive nature of studio-based learning, as a special variant of problem-based learning, has been adopted and adapted for the use in a wide range of expressive and technical disciplines. However, the academicization of design disciplines and their struggle to establish and communicate to their institutions the integration of the activities of designing as rigorous form of scholarship have led to a generalized idea of the design studio as a universalized pedagogic strategy that perhaps misses the unique difference between creative and design fields. While sharing many similar conventions, the ways in which the design studio within industrial design education operates should not be conflated with its use in fields of education such as graphic and fashion design, architecture and the creative arts. Theses disciplines engage in many similar conventions and processes of problem solving, but have necessarily different philosophical, social and economic underpinnings, different disciplinary intentions and outcomes, and therefore necessarily different pedagogies. However, with such a wide adoption and re-contextualization into non-design disciplines, there is the risk that the idea of the design studio as a generalized educational strategy in interdisciplinary learning may get elevated over and above the specific needs and knowledge domains of a discipline, so as to become a curricular instrument in the service of itself.
3.3 Signature Pedagogies

The studio, the atelier, the workshop and the museum have perhaps been
induced into the mainstay of industrial design education as much through the
practicalities of educational delivery as the collective recollections of designers;
recollections that, often many years after their formal disciplinary training,
form a narrative of their own education through a selective historicisation and
ascribed professional significance. Such recollections, delivered through the
interchange between designer as teacher and students, maintain disciplinary
conventions and pedagogic orthodoxies. Indeed, the signature pedagogies of
industrial design – the brief, the project, the sketch, the rendering, the model,
the prototype and the presentation – are similarly produced and maintained.

The disciplinary specificity of teaching and learning within a studio model
demands particular strategies or signature pedagogies that provide ways
for designer teaching to impart understandings and expertise of design
practice through the overarching model of project-based action learning.
Signature pedagogies are the strategies deployed to activate particular types
of disciplinary learning towards the forming of professional habits. Lee S.
Shulman (2005) in trying to define signature pedagogies, describes them
as having three structural dimensions: a surface structure, comprised of
the operational and instrumental acts and the routine interactions between
learner and teacher; a deep structure, which converts experience into a set
of assumptions as the right, or best way to teach and construct learning; and
an implicit structure which constitutes the moral positions and professional
dispositions of a given field of education. Shulman states that “signature
pedagogies prefigure the cultures of professional work and provide the early
socialization into the practices and values of a field.” (2005, p. 59)
Typically contained within the parameters of a comprehensive design project, these strategies follow a specific operational or surface structure sequence in industrial design education. Design projects are often framed through a textual article known as a brief. The brief provides learners with a design problem or challenge, the basic contextual or client requirements, technical constraints and milestones for the delivery of the project. Once the brief is interpreted, the learner commences an iterative process of developing potential ways forward through a combination of two-dimensional sketches and three-dimensional sketch models. These gradually form as concepts and scenarios that are then visualized in more formal renderings of the learner’s preferred solutions. These rendered concept visualizations are then detailed through technical design activities. The process of detailing or refinement requires a different approach to the drawing and sketch modelling, in which a sorting through of the hard constraints of manufacture, implementation and use is commenced. Once their design response is suitably refined, the learner then proceeds to model or prototype it. The model or prototype then acts as a tangible artefact that is tested against the specifications of the brief and ultimately used alongside technical and manufacturing drawings to communicate via a presentation of design intent, to clients, manufacturers or users, the exhibition of design outcomes, and the exposition of design responses for the purposes of critique.

Throughout this sequence each stage is presented by the students and critiqued by peers and teachers in order to further refine the response as appropriate to the particular needs outlined or inferred from the initial brief. The deep and implicit dimensions of each of these signature pedagogies are described in the following paragraphs.
3.3.1 The Brief

The design brief provides a way to rapidly orient a design student towards the particularities of a project. Sometimes briefs can be prescriptive, but often they are left loose enough for the learner to define independent courses of action towards design. In complex design projects the brief often defines the roles required of individual members of a design team, and more often than not takes a declarative position on the overarching social agenda or contextual problem that the project aims to address, be it commercial, social, technological, conceptual or environmental.

There are three notable aspects to the brief. The first is the use of a textual article as the framing device to induce design responses. The brief as a textual artefact requires a set of pre-established capabilities from learners: the capacity to read, to interpret, and to discuss and think through what is omitted from the text. The need to be able to read between the lines of a brief demands a high degree of textual literacy form the student as a fundamental capacity. The second is that the brief sets up a common scenario for design so that all students are working towards the same ends via a shared problem construction. That they arrive at solutions that are different provides both the learning community and the teacher a means by which an individual’s design capabilities and development can be appraised relative to others. The final aspect is that the brief instils an appreciation for brevity of description in both the ways often complex and technical industrial design concepts might be conveyed back to a client or stakeholder, and in the ways a client or a stakeholder might articulate a new opportunity for design. For the industrial design educator, the project brief is a crucially important instrument. It sets tasks, timeframes and the division of labour within a project, and provides a means by which a narrative for the project and what meanings and capabilities for practice underscore the particular design activity.
3.3.2 The Sketch

Drawing serves a key role as a primary method of thinking through possible solutions to often quite complex problems in ways that are infinitely flexible, at once a form of intra-personal dialogue, and a means for communicating design intentions (Lawson, 1980: Lawson, 2004). Like the brief, the sketch demands a degree of basic capability to commence a process of design, but the sketch provides an alternative means by which limits to textual literacies can be offset. The usefulness of design drawing as a means of basic education was recognized very early, as evidenced in the institution of Free Drawing Acts in the United States, and its use as a driving pedagogy in the Design Schools movements (Bolin, 1995) and the near global inclusion in compulsory education throughout the western world in the second half of the 19th century. Both drawing and modelling allowed learners to articulate, through visual and tangible objects, the complexities of design things that many would yet have a vocabulary to fully describe, in ways that could translate design intentions to producers. Despite a significant shift to a digital workflow for industrial design over the past two decades, the role of the sketch, as a the central means of thinking through problems of a product form or process and rapidly progressing design ideas, has retained its centrality in education. For the design educator, the sketch and actively sketching acts as a mechanism for interactions with individual students on the development of design ideas. As such it can be considered a conversational device (Lawson, 1994: Schön and Wiggins, 1992) that produces a visual record for the learner to reflect on as they develop their responses to a project or problem.
3.3.3 The Sketch Model

The use of sketch modelling in industrial design resembles the use of the maquette in the fine arts and architecture to give a rapid sense of a form or mechanism in three dimensions. Sketch models are used when there is not a critical need for precise detail but a general sense of the form and scale or how an object might interact with users or other objects is required in order to progress a design. Sketch modelling has numerous sub-practices, including scale models and mock-ups to show intentions for form and arrangement; quick and dirty prototypes to test mechanical, structural and user interface principles; paper prototypes for showing the temporal sequence of a digital interface, product or service; breadboard or technological prototypes to generate proof of concept in electronic and interactive prototypes; and increasingly low-cost 3D printed models to test small mechanical details, form factors and assembly. Sketch models operate between student and teacher in much the same way as a drawn sketch but offer a much more detailed avenue by which discussions on technical and form parameters of design can be entered into.
3.3.4 Concepts and Scenarios

Potential directions form as design concepts and scenarios as a student moves through a design project. These are refined through activities of visualization and modelling and act as a tangible strategy to engage in discussions with teachers, other students and external stakeholders to further develop design responses to a project. Often concepts and scenarios are set as a critical milestone for a project, and very often multiple concepts are required in order to draw out aspects of each to progress the project. The nature of concepts is highly variable and contingent on the underlying agenda for design set out in the brief. This variability can see concepts tilt toward the esoteric or experiential, the technical, the aesthetic or the systematic, in which the students articulates a holistic account of a possible design response from the product or artefact right through to the business model or service that might support it. Scenarios, on the other hand, are typically concerned with how a particular impact or outcome might be mediated through a social, technical and temporal system of things.
3.3.5 The Visualisation

The typically oral presentation of design concepts and scenarios are almost always conveyed through some form of visualization. Traditionally this role was undertaken through a process of rendering a realistic account of a product and its operational functions through static illustrations or finished art. In the product design and automotive design space, activities of visualization are highly valued and constitute critical stages in the design process. As industrial design has shifted to digital modes of practice, visualizations have become far more sophisticated and frequently involve the generation of film and animation, detailed two-dimensional compositions in context, and diagrammatic and annotated representations of a product or service as it might be experienced in use.
3.3.6 Detailing

Design detailing is a process that typically sits between settling on a design concept direction and converting it into a manufacturable or deployable artefact or service. Detailing involves a process of defining all aspects of a design that need to be constrained in order for it to be fully communicated to external parties. In this way the product under design gets atomized from a broad concept to a kind of system, in which all of its parts and components are treated as contingent so as to ensure all details are articulated. Design detailing is undertaken through a combination of sketching, research, modelling and technical drawing, and the interactions between students and teacher in this phase shift toward the technical and the pragmatic.
Modelling emanates from the very early years of serial manufacturing prior to the establishment of drawing standards, when designers would produce representational models of their designs in clay, wax, plaster and wood as means of transmitting design details in quite precise ways to manufacturing clients. At an advanced level models are often made in approximate materials, and fields such as automotive design full-scale clay models are used as a key process for a variety of design analysis and pre-production tasks. While used as a penultimate means of communicating a design idea through the 20th century, the role of the representational model inside contemporary industrial design practice has over the past 15 to 20 years almost entirely been translated to computational 3D modelling, in which precise details can be simulated and detailed drawings can be derived from a single operation.

Prototyping, on the other hand, requires the designer to produce their designs in a working or useable fashion through the materials and processes in which the design is to be serially produced. This strategy provides design education with a set of hard and pragmatic requirements that elevate mere visions of a product to actually dealing with the detail and specifications of a thing to be made. The kinds of prototypes produced in education now are highly sophisticated and leverage the interoperability of computer-aided, additive and advanced manufacturing techniques to realize highly complex prototypical products in ways that can provide a completely realistic appraisal of the effectiveness of a design. Other forms of prototyping now common inside industrial design education include fully functional electronic, interactive and mechanized prototypes that bridge industrial design capability into fields of computer science, electrical and mechanical engineering, and

3.3.7 The Model and Prototype
service prototyping which tests in realistic ways the interactions of a user moving through a temporal service scheme. Both modelling and prototyping locate the learner in the workshop, confronting and mastering tool and material use, and the activity of dealing with various specialists and trades inside the manufacturing domain. This strategy works to maintain close linkages back to the factory floor, the needs of workers and clients, and importantly demands that novice designers learn to communicate through their designs with various stakeholders and using various technical vocabularies.
3.3.8 The Technical Drawing

Now largely automated through 3D modelling software, the technical, dimensioned or engineering drawing harks back to the kinds of drawing developed through the early design schools movement and serve as a means to communicate precise design intentions to engineers, fabricators, pattern and toolmakers and other trades involved in the manufacturing domain. In educational settings the technical drawing typically accompanies prototyping activities, but often is used as its substitute as a key stage in the delivery of a completed project.
3.3.9 The Presentation, Exhibition and Critique

On completion of a design project students present their responses for appraisal. This is generally done through an oral exposition to a panel or jury of experienced designers. The panel interrogate the design decisions made, the ways in which the student managed the workflow of a project, and the potential of the design outcome to impact on the underlying agenda of the project. Cultures of critique in industrial design differ from those in other creative and design disciplines in that the process of critique is often less about the assertion of an idea as a viable or theoretically robust proposition and more about the execution of all aspects of the project and the relative merit contained within competing stages and activities. It is quite normal for presentations to occur within either an exhibition or a pitch-type format. The exhibition provides a means by which the work of all students can be seen, enabling the celebration of outcomes and the generation of a collective and public method of inducing reflection. If the pitch is more commercially derived, students describe their project outcomes and activities to a closed panel as a simulation of the ways in which a designer in a manufacturing company or a consulting practice might practice.

Many of these strategies link back to the initial prototypical curricula and pedagogies of industrial design discussed in chapters one and two, and while adapted to changed social, economic and technical conditions structure the ways in which design practice can be simulated in and educational context. That these signature pedagogies have been carried into various re-imaginings of industrial design education and maintained within professional practice for nearly 200 years, despite being an initially contrived structure for the purposes of framing a new form of education, can be seen as either evidence of the
validity and efficacy of the method, or as a kind of unwitting skeuomorphism of process or simula in which the initial simulation of practice for education becomes actual practice that new formations of education then imitate.
3.4 Identity Construction: Scripting & Pre-scripting

As industrial design students learn through ongoing exposures to a range of studio projects as the primary pedagogic device throughout their education, it follows that the identity attained and evaluated is either re-inscribed and built upon in a cumulative fashion or reinvented from project to project. The identity constructions of design educators follow a similar path. The designer as teacher, in moving between contexts of professional practice and simulations of practice within educational contexts, can be seen on a spectrum between mentor and as a type of instructional para-professional. Designers who teach often draw on aspects of their own education as a way of constructing particular approaches to teaching.

The industrial design studio model, in its most reduced and universalized form, provides an underlying structure for ‘non-teacher’ designers to reconstitute their commercial professional practices as a kind of quasi-pedagogy. This quasi-pedagogy sees the cycling of professional designers in and out of teaching and produces different constructions and meanings of practice for learners. In delivering a design studio project, the designer as teacher assumes all manner of roles including, instructor, manager, client, producer, critic and consumer, and inevitably the designer as teacher tacitly draws on recollections of their own teachers and their methods as a template for practice. These roles serve as a means by which the design responses of students can be developed, tested and iteratively refined. The designer as teacher enters into education as an interlocutor who brings, and (as is often the case) ‘banks’, current and often quite contextually and organizationally defined meanings and techniques of practice. While the question of identity
construction is tangential to the main curricular aims of a design project and
the responsibilities of designer teaching, the design studio as a generalized
model implicitly orients itself around the development of professional practice
identities for learners through two processes. The first is the process of pre-
scripting, driven by externalities that the learner brings into each project. The
second process is the combined effect of internalities through the use of the
project, its pedagogic moments, and the identity performances of the teacher.
3.4.1 Externalities

The process of pre-scripting is driven by a combination of social and contextual externalities, and the pre-figured expectations of learners towards what being an industrial designer might mean. The design studio, like many models of professional education, leverages pre-scripted notions of the profession as means of unpacking meanings for practice. The existent and aspirational identities of studio participants invariably creep into the educational moments of a design studio and colour how students respond and develop. Prefigured expectations of learners manifest in all sorts of ways: industrial design as a creative or technical profession; or as an education in inventing; or as a means by which a learner might attain a career working in quite specific product domains such as automotive or furniture design.

These expectations of what an education in industrial design ought to entail are further complicated by the inclusion of social discourses, the individual backgrounds of learners, and the many roles students adopt in navigating a project. Social discourses produce and reproduce ideas of the discipline within a cohort of learners. The individual lives of learners, their preferences, cultural backgrounds and politics, similarly contribute to the negotiation of identity questions. Design studio projects require learners to assume multiple roles for the progression through a design project. These particular identity performances provide a means by which the various roles that a designer in practice might take and allow testing of the different professions with which a designer might interact.

These ideas of practice identity form as expectations for professional practice and education in all sorts of ways, and produce an important dialectical tension in the ways in which design studios unfold for learning and
teaching. When given legitimate space, these negotiations can be opened out through the studio and constitute a key enculturation component through the constant enlargement of cultural exposures that a cohort of designers in preparation should encounter.
3.4.2 Internalities

The internal dimensions of a design project play a significant role in locating the negotiation of externally derived ideas of practice. The studio model uses the implicit motivations and aspirations of learners, discussed previously, to promote a particular professional identity as a lever within the educational frame. The iterative nature of studio-based learning serves to inculcate and normalize desirable practice identities through approximations and projections of professional practice. This occurs through the modelling of appropriate disciplinary behaviours via continual application, discovery of and reflection on practice through successive projects. These behaviours are significantly moderated by the temporal parameters of a design studio project. The combination of analytical and creative approaches taken to issues of aesthetics, utility and production, and the way in which that synthesis is represented through visualizations and models, is an important aspect of disciplinary identity acquisition for learners. Formal and axiomatic theory is rarely encountered or imparted in a studio project. The 'right' ways to practice are learned through the negotiation of appropriate disciplinary behaviours and by demonstrating those behaviours through a set of often prescribed design research and communication conventions. The process of learning is largely recursive, and the dominant relationship between learner and teacher is one of confession and counsel, presentation, revision and critique.

As a function of the design studio learners are generally required to adopt multiple ontologies and function as if designers, producers, makers, sellers, consumers, users, re-users, and so on – which in turn sees learners themselves simulating various professional archetypes that the designer in practice might encounter but will not be. Orthodoxies of professional preparation through
the simulation of practice and the modelling of appropriate disciplinary
behaviours within studio-based learning become a place for negotiations of
meanings of practice for the individual and the collective. This scripting is
done through a combination of methodological and behavioural expectations
into which the multiple ontologies of practice can be temporarily situated,
questioned and either reified or re-made.
3.5 The Nature of Design Studios at RMIT University

While design studios sit as a near universal curriculum structure across industrial design programs, the particular institutional and contextual conditions ensure local specificity. The design studio culture in the Industrial Design program at RMIT University has its own and perhaps unique dimensions which are useful to define prior to presenting case studies later in this and following chapters. Industrial Design at RMIT University is a four-year undergraduate degree situated inside a large school of Architecture and Design. Its sits alongside undergraduate degrees in Architecture, Landscape Architecture, and Interior Design, various specialist-design-focused masters programs, and a large number of design-focused sub-bachelor offerings in its Vocational Education and Training division. Across the school the notion of the design studio is given primacy as a site in which industry and community relationships are fostered and maintained and where design research activities undertaken by the faculty are integrated with the teaching of undergraduate students. While there is an overarching approach to the use and value of the design studio, each disciplinary field has its own nuanced ways of attuning it to their external stakeholder community and their respective cohorts.

The Industrial Design program at RMIT University positions itself as a generalist degree with a series of underpinning agendas for practice. These include socially oriented design and new product and service innovation foci in discourses of sustainability, contemporary craft design, design for health and design for tangible interactions. The program has a strong research presence and maintains a reputation for disciplinary innovation. These engagements are generally facilitated through industry partnering with the program in
various ways to deliver design studios as a way of introducing students to the variance of industrial design in the professional domain. Academic staff often develop design studios that bring students directly into their fields of research, to play with concepts and to accelerate the development of possibilities in design research.

In this context each studio is framed as a unique enterprise, with its own methodological orientations and design output requirements, but with defined expectations for learning outcomes that are common across all unique studio offerings. Communicated to students through posters, presentations and a website in the lead-up to each new semester design studios in industrial design are ‘balloted’ in that students from multiple year levels enter a ballot for the studios that they want to do the most. Once a cohort of between 16 and 20 students have been accepted into a studio they are presented with a detailed project brief to fully frame the studio experience. Design studios typically have a 12-week duration with a few weeks at the end for students to concentrate on the final delivery of learning outcomes. In any given semester there are six foundation studios offered into the first year and around 12 design studios offered in the second and third years of the program. The design studios represent an additional element in the RMIT curriculum in that they provide methodological and managerial templates for design projects into which final-year students can define their own self-directed design enquiry under supervision from an academic. In this context a design studio occupies half of a student’s total normal full-time semester load and is supported by a series of design theory and technical courses. Most studios result in prototyped and tested outcomes alongside other documentation of the design development process. Student design outcomes are collectively exhibited at the end of each semester as a public showcase and celebration of the creative capacity of the cohort.
As industrial design is a professional practice that requires the capacity to confront and deliver design responses to continuously changing technical, social and commercial landscapes, the particular subject of a design studio or design project is largely arbitrary. The design studio structure at RMIT openly plays with the arbitrary nature of topics for industrial design to build up broad approaches to practice and a diversity of methods. Often framed under themes, such as ‘health’ or ‘sustainability’, the nature of design engagements in education is opened out in relation to concepts of Cultural-Historical Activity Theory in the following section. The activities undertaken through design studios and via its signature pedagogies ascribe, reify or rupture the social and operational meanings of future practices of design, and thus incrementally build and renew normative values and cultural meanings.
Cultural-Historical Activity Theory (CHAT) is a useful way of interpreting the structural workings of industrial design education and the various performances of learners and teachers in the process of disciplinary enculturation. Developed initially by Russian social psychologists Lev Vygotski, Aleksei N. Leontiev and Aleksandr Luria in the early 20th century, and progressed by Michael Cole (1996) and Yrjö Engeström (2009), CHAT provides a cross-disciplinary framework for studying how humans purposefully transform natural and social reality, including themselves, as an on-going culturally and historically situated, materially and socially mediated process. (Roth & Lee, 2007)

This framework proposes that people collectively operate through culturally defined and object-oriented actions (Vygotski, 1978). These actions and their requisite cultural dimensions are learned and articulated back to culture through the ‘doing’ of activity. Learning and communicating constitute action and in order to act people design, produce, adapt and deploy tools and methods relative to the context of action. Once undertaken, meanings and values of an activity are socially constructed and as such entered into cultural-historical precepts (Leontiev, 1978). CHAT has been widely applied to educational and workplace learning theory and provides a framework for understanding the industrial design studio and the role of the ‘subject’ as a particular pedagogic strategy that supports the social determining of disciplinary meanings within the educational frame.

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3.6 Subjects, Themes and Topicality

Cultural-Historical Activity Theory (CHAT) is a useful way of interpreting the structural workings of industrial design education and the various performances of learners and teachers in the process of disciplinary enculturation. Developed initially by Russian social psychologists Lev Vygotski, Aleksei N. Leontiev and Aleksandr Luria in the early 20th century, and progressed by Michael Cole (1996) and Yrjö Engeström (2009), CHAT provides a cross-disciplinary framework for studying how humans purposefully transform natural and social reality, including themselves, as an on-going culturally and historically situated, materially and socially mediated process. (Roth & Lee, 2007)

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Subjects are, in a Vygotskian way, the particular cultural motivation that can
be encountered through the artefact, thing or phenomenon that is exposed to object-oriented actions of individual and collective learning through designing. The subject of a design project serves as a means by which tools or techniques are deployed through rules or methods, roles within a community and the divisions of labour required with respect to a particular object or objective. The fuzziness of a design project is brought into some structural focus when viewed through a CHAT framework (see Figure 3.1).

Figure 3.1. A variation for design education based on Leontiev's Second Generation of CHAT (Engeström, 1987, p.78).
Often what is subjected to design learning activity is determined by the design educator in response to a macro-scale concern or opportunity for design practice that has emerged as an outcome of prior socio-historical-cultural activity. This could range from professional and economic shifts or threat of change, to environmental or social discourses, or incursions into theoretical or philosophical domains. Alternatively, the design educator might determine a subject around particular product typologies, varying scales or modes of production, methods of design, technology or material types, or particular ways of working. Similarly, the objects or objectives of a thing or phenomena that is subjected to design can be positioned as the locus in the structuring of activity. However, it is the collected and reflected-upon outcomes of activity that provide the recursive return for both learners and educators as a means by which the social, technical and methodological spheres of design learning activity can be critiqued, refined and re-practised in the activity of future subjectifications of designing.

The idea of a ‘subject’ to orient learners in particular ways within a design project can be seen as a subset of more a general thematic structuring that might be used to organize facets of a curriculum. Thematic domains are often used to relate design activities to broader socio-technical concerns and discourses through the inclusion of macro-scale discursive tensions that sit above and provide context to design activity and the often micro-scale concerns of its subject matter. In the initial institutionalization of industrial design through the new schools of design in the 19th century issues of industrial reform and the economics of trade, technological transformation, and the social implications of industrialization could all be considered themes for design. These macro-level agendas were carried through a new form of education for a new type of design practice that leveraged emerging notions
of material culture, and the capacities of serial manufacturing as a means by which consumption could be activated, accelerated and maintained. These concerns were exercised through the design of often-small things – consumer products, tools, furniture and decorative elements for a growing Victorian middle class.

As thematic framings are necessarily broad, and as design practice needs the capacity to move fluidly between themes and contexts of application, the notion of a specific ‘subject’ of enquiry in the educational space is consequently rendered arbitrary. However, this relationship can be seen as a pedagogic foundation, developed and continued from the very earliest forms of industrial arts and design education. Learning to be agile, adaptive and open to the specific design needs of manufacturing clients or user groups, or the development of new product types, demands a plural conceptual capacity and – critically – the need to set aside, and step outside of, personally determined subject domains. The absence of clearly defined subjects for design in the self-directed design investigation captured within the early Schools of Design capstone Technical Studies courses that distinguished industrial designers from other levels of design education provided opportunities for aspirant designers to define for themselves subjects by which methods of design intervention into particular industrial, aesthetic and utilitarian contexts could be explored.

Subjects and their overarching thematic framings do, however, need to be seen as different from the topic or topicality of a project. Topicality provides both learner and teacher with a point of contention from which to position their orientations to both a subject and object of design activity. This positioning operates as a dialectical device with which learners can build a conversation about the socio-technical-environmental implications of design
action in their contexts of living and working. Playing with the subjective
dimension of a project is a normal practice for an educator and student as
a project develops, hits blockages or requires humour to unfurl it towards
productive and relevant learning. Approached through discrete exercises
with groups of students, or through engagements with individual learners
within the boundaries of a larger design project, ways of playing with these
distinctions are typically formed around two main strategies: inviting the
ridiculous or farfetched as a means of dealing with method; and the nudging
of conceptual clarity through the imposition of either the ludicrousness or the
seriousness of a subject. In the following sections, these kinds of negotiations
are discussed in relation to two case studies from teaching.
3.6.1 Case Study: Radio Machine – Arbitrariness and the Plasticity of the Subject

Often when students are doing complex design projects in the realm of new product or service development, there is a slide towards conservative readings of a situation under design and of the ways in which responses to a situation are made manifest. Testing just how plastic the notion of a subject can be inside industrial design education sits as a particular strategy in the researcher’s own approach and was initially deployed in a studio project called Radio Machine at RMIT in 2006. A short studio project of about six weeks designed to help first-year students to develop capabilities in managing and delivering design projects, Radio Machine sought to challenge prefigured expectations of industrial design, while at the same time delivering required learning outcomes. Radio Machine played with the notion of the arbitrary for industrial design in its specific subject matter by setting up a collective challenge for a small student group to design and construct a complex mechanical (automata) noise machine and pirate radio station. As a foundational activity in industrial design, students quite naturally approached the project with trepidation, but as the logic of tasks was laid bare the fact that the subject matter and projected design outcome of the project was so ridiculous provided a collective enthusiasm to progress it, and to learn the technical design tasks required to materialize the outcome.

The project required all 16 participating students to vocalize the most annoying sound they could make. The structure of this sound was then broken down into its mechanical and temporal elements and a small mechanism was designed to reproduce it in an abstracted way. Each mechanism was then categorized into different mechanical drive methods that could activate it and
then redesigned to work from a pair of common drive shafts powered by a hand crank. Students designed a table-based structure to mount each sound machine and the drive train. They then reworked their individual concepts to be produced through a set of common materials and processes through sketch models and through learning to use 3D modelling software for the first time to generate part files for laser cutting and other production processes, and complex digital assemblies for use in final production. While these elements were being produced other aspects of the project came into play. Small teams had to research, design and produce systems for amplifying and mixing each of the sounds, develop and build a small radio transmitter, and design and produce event collateral, including eye patches. Once completed the project was launched in an exhibition format with a series of radios dotted around the area broadcasting the awful sound of each device in concert as people (wearing eye patches) turned the hand crank to activate it.
Driven by a concern with the problem of how history education in design might be better directed toward practice, the researcher’s students undertook a series of experiments in the plasticity of history as a subject. As design history itself formed as a discipline of academic enquiry, its impact inside undergraduate industrial design curricula tended towards sequential and sociological orientations to the ways in which histories of design, through their artifacts, might provide meaning through the re-articulation of historical narratives. While important in establishing a set of socio-cultural references by which encounters with designed things could be interpreted and seen relative to other things, for students a conventional design history approach often provided little in the way of the development of methods (other than desk research and writing skills) that were useful for practice. Many aspects of this focused and contested field of design history are of course tremendously useful once a sense of practice has been acquired, but what was lost in the translation of this new field of history into education was how the outcomes of design activity feed into the construction of cultures and epochs for historical representation, and how in turn the representation of these epochs and cultures might be re-represented through practice.

To tackle these questions, a project of redefining the location of history education within the curriculum was undertaken through two moves. Move one involved making a claim that history in industrial design education was a purely methodological concern and not a subject for design. In taking this position conventional histories of industrial design did not necessarily need to be explicitly taught and were easily obtained through books and the

3.6.2 Case Study: From Different Histories of Design to Ubiquitous Ingenious

Driven by a concern with the problem of how history education in design
internet, providing students were equipped with research skills that could allow this to be undertaken independently. In defining normal histories of design as being students’ responsibility to study independently, the need for historical exposures that expanded beyond dominant ‘movements and styles’ approaches to teaching history to a history curriculum that allowed learners to see the contexts and drivers behind the generation of design brought into focus the processes of history making as the central subject. This transition of ways of teaching design history as a methodological concern went through several iterations. The first centred on the elevation of different histories of design that brought in thematic markers to give greater definition to the historical constructions of designed things. The second move was to dedicate time in the curriculum to more focused historical enquiry, and an education in the roles of history in framing and reframing meanings of and for practice. The final approach was to use a historical artefact as a device for activating a forensic history of unknown things and invisible designers. This approach located learners as active makers of history, and was undertaken over successive semesters from 2007 to 2009 through a first- and second-year design history course in collaboration with the Melbourne Museum’s Archive.

Titled Ubiquitous Ingenious, this history course engaged students in the primary research of yet-to-be-documented artifacts of the ‘domestic technologies’ collection of the Melbourne Museum Archive. Students scoured the collection, looking at mostly locally designed and manufactured products and choosing particular things to focus their historical research tasks. Artifacts chosen ranged from early versions of facsimile telegraph machines and industrial computers to locally designed and produced modernist furniture, Australian-designed cars to early lawn mowers and other domestic appliances. Students had the task of selecting an object, talking to curatorial staff and
commencing research based on snippets of information that could be read from each artefact. This research task was then framed through an essay that established the provenance and significance of each artefact: where and when it was made, who designed it, what patents may have been derived from it and the social and contextual situations within which it operated. Alongside the museum-based activities, students undertook a similar process to prepare a social history of an artifact of significance to their family life. This entailed selecting a valuable or useful family object and developing an oral history of it and its significance with reference to social and cultural practices. The project brief provided to students can be seen in appendix (3). Each essay was combined to produce a collective report of the ingenuity of everyday objects. While not attempting to directly introducing students to the history of design, it provided a robust way in which the construction of historical significance could be understood as a process of research for design through enabling interactions between students and experts in the museum.
3.6.3 Topicality

Topicality denotes the inclusion of two core things by the design educator in the construction and delivery of a project: the use of the social structures of a cohort of learners undertaking a project, and the construction of a particular narrative for design to make positive impacts in a given context. The former concerns the sociality of learning to design through actively designing, where students work together and critique each other’s actions in view of collective development, providing a scaffold onto which the ideological – and often moral – dimensions of intervening through design in problems or phenomena and the socio-technical systems that surround them might be unpacked. The latter concerns the educators’ role in the provision of a specific narrative that necessarily contains both historiographical and rhetorical dimensions. This narrative is used to champion or challenge particular positions for design within a particular context or theme via a subject of design action. As such, the topical domain of design education is overtly political in orientation, in that it positions the educator as an agent or provocateur, and asks aspirant designers to convey the meanings of their design thinking activities with explicit reference to the socio-technical implications of designing in the given particular context. The negotiations of meanings for practice activated by topicality provide a reflexive bridge between broader socio-technical outcomes of designing and the continued development of disciplinary capabilities by either reifying or rupturing normative ways.

However, while arbitrary, the use of a subject serves as a way to pre-orient learners towards often quite specific disciplinary ways, and importantly to collectivize the topic of discussion that surrounds design activity to avoid a drift towards instrumentalism in learning and teaching. This point is
particularly important in understanding how pedagogic structures in industrial
design, which by and large is a technical discipline, are distinct from those
in both engineering disciplines and the fine arts. For fine arts education the
’subject’ is by and large the determinant of the methods and tools of practice,
and the topicality of practice is defined by the learner. For engineering
disciplines the methods, tools and roles of a project are by and large the
subject matter and topicality emerges towards the end of enquiry in the
inference of future applications of methodological discoveries.
3.6.4 Adapting CHAT as a Model for Industrial Design Pedagogy

Once a subject, object, thematic and topical position is determined by the educator, the task of structuring curricula engagements in undergraduate industrial design education manifests as negotiations of context and practice. These negotiation processes are, for the designer, fundamental to the delivery of appropriate design outcomes. Similarly, for the design educator this negotiation constitutes a key curricular mechanism for the development and delivery of disciplinary capabilities that can adequately contend with the shifting nature of project content in practice. Contextual negotiations pertain to the particular cultural or organizational conditions, situations and locations into which design activity is either undertaken or is directed towards. Practice negotiations denote both the methodological means by which, and reasons why, particular design activities are undertaken and how those activities and their outcomes intersect in context. Often methodologically based activities are referred to as interventions, particularly when they seek to produce some form of change or transformation to a contextual problem. It is useful to think of this model of curriculum development as an overlay to Vygotski, Leontiev and Engeström’s various models of cultural historical activity theory (see Figure 3.2).
Figure 3.2. A further adaptation for design education of Vygotski, Leontiev and Engeström’s various models of cultural historical activity theory (Engeström, 1987, p.78).
In design projects, contextual and methodological practice engagements are almost always grounded by elements that are either ‘real’ or to be ‘realised’. The inclusion of the ‘real’ becomes, for learners, an authentic experience into which their development is situated. These elements might include the authenticity of design processes, techniques or outcomes, or alternatively direct linkage to clients, manufacturers or user groups. The authenticity of either the practice or context elements of an industrial design project is often amplified by the inclusion of one element as a ‘fiction’ that provides the learner with the relative safety of a speculative location for design development to take place, and operates as a kind of buffer between the student and the commercial or contextual realities that might otherwise dominate a project. Working through fiction does not, however, exclude the learner or the teacher from engaging with authentic theoretical knowledge as a basis for in-depth design thinking. Fictional negotiations are vital as they provide a means by which the development of design capabilities in speculating, proposing, questioning, back-casting, scenario development and narrative construction can be undertaken unencumbered. Authenticity, on the other hand, is used as a mechanism to situate the curriculum through hard knowledge and skills, and within contexts of engagement with which designers need to be familiar in order to develop as grounded and functional professionals.

This connecting of the ‘authentic’ and the ‘fictitious’ for the purposes of learning constitutes a model entitled the Ficto-Authentic Typology (FAT) of project-based learning in industrial design (Figure 3.3). The model acts as a means by which project-based design curricula can be understood in broad terms, and has four key modes or permutations which are often interchanged.
throughout the course of a design project, as the educator gradually adds complexity as the project progresses, or when a learner begins to actualise what they have imagined and to reconcile their practices against the professional practices to which they aspire. The four main modes of the FAT typology revolve around exchanges between contextual and methodological content that are positioned as either authentic or fictitious. When seen as a set of relations for both developing and interpreting curricula, each mode has its own boundaries that offer both the learner and the educator different structures into which meanings of design practice can be exercised. These four modes are described in the following sections and elaborated upon through reflection on case studies undertaken within each mode.
3.7.1 Buffered Projects

Buffered design projects consist of authentic design or methodological interventions applied to a fictitious context. They involve a student designing and producing a realistic material or service system outcome in response to a set of authentic and often technical problems for the inferred application within a fictitious situation, environment, need or desire. This type of project modality exposes learners to methodological and technical discourses and practices, but does so in the absence of contextually situated authentic learning. Contextual negotiations are generally done at a distance or inferred through the individual and collected prior experiences of peers. Projects framed in this way are often used early in the education of industrial designers, as they provide a buffer between the application of novice design capabilities and the pragmatic realities of doing design in a real-world setting. The ubiquitous ‘design brief’ — a signature pedagogy in design education in which elements of the project are authentically situated against those that are fictitious — exemplifies this modality.

3.7.1.1 Buffered Projects Case Study: Freight Bike Studio

Freight Bike was a technical product design and prototyping studio for second-year students framed around a tension between pragmatic and ideological positions for industrial design. The studio co-taught with Scott Mayson in 2007 used a combination of practical and fairly conventional product design practices such as concept visualization, technical drawing, scale model making and prototyping. These design activities were augmented through the provision of provocative and theoretical positions including collective readings of texts such as Ivan Illich’s *Energy and Equity* (1974) as a means towards generating new kinds of bicycle-based products as
infrastructure for micro-enterprises. Various scenario constructions were used to locate the need or plausibility of these enterprises, and students developed business plans to sit alongside purpose-designed freight, cargo or working bicycles. Excerpts from the project brief read:

For many commercial activities there is a need to travel short distances and to have re-locatable trading location……It is only in the last 50 years that the majority of these (light duty) activities have shifted from being done with human or animal power ……Increasingly there is a shift away from high energy using cars, as government agencies and small businesses try to minimise traffic congestion, pollution and infrastructure costs. This shift presents opportunities for the design of new (or old) ways of carting goods, trading and servicing commercial and municipal assets.

Students worked in teams to generate concepts, produced detailed technical design documentation and prototyped functional versions that were then showcased through participation in a Critical Mass rally (in which thousands of cyclists ride as a group through the centre of the city – and cities worldwide – as an act of protest against the dominance of cars).

3.7.1.2 Buffered Projects Case Study:
Transfer Studio Projects

Given the historical dominance inside industrial design curricula of a disposition towards product design for mass manufacturing projects that allow students ways to appreciate the social and economic implications of a manufacturing construct that might be taken for granted is useful. The Transfer Studio (Figure 3.4), a design studio project linked to the Gujarat Innovation Augmentation Network (GIAN) and the National Innovation Foundation (NIF), two Indian non-government organisations (NGOs),
provided a means by which students could be immersed into spheres of design for manufacturing that are not easily accessible. GIAN and NIF work with rural and poor communities throughout India to assist in the technical transfer and protection of inventions. These inventions are very often aligned to the development of micro-enterprises or to make particular jobs more efficient, safer or more cost-effective. Projects were developed around a series of inventions, and students worked in teams as an approximation of product design consulting practice to take each invention through a series of prototyped concepts that offered ways to consider these inventions as products for various markets and scales of manufacture: as low-volume fabricated goods, as goods for developed world markets, and as mass-manufactured global products.
As the partner or client community was in India and the studio was conducted in Australia, there were barriers to the provision of grounded research opportunities. To enable a suitable immersion into practice, the process of design development and project documentation focused heavily on the delivery of immediately manufacturable outcomes through the development of detailed engineering drawings and specifications and the production of prototypes through the processes that would be used in actual manufacture. As such the studio described in more detail in appendix (4) tended toward the technical in method, and the contextual parameters sat as a driver for particular considerations around ideas of the social and economic discourses of manufacturing and the differences in the value of production between developed and developing manufacturing economies.
Propositional Projects

Propositional projects involve a fictitious methodological intervention in an authentic context. Students design through speculating upon possible paths toward solutions to real problems. This mode of project acts as a means to propose and illustrate the potentiality of design intervention into real-world problems, desires and needs. It engages learners in the negotiation of an authentic context and its concerns via the propositional and conceptual thinking and visualization methods used in design. It privileges the social discourses of context and concern over the technical.

Propositional Projects Case Study: Quick Fix Studio

Quick Fix (Figure 3.5) was a studio that used the prospect of policy reforms to elevate issues of sustainability and changing local economic circumstances. Devised and delivered in the lead-up to the passing of the Australian federal government’s Clean Energy Act 2011 (which has since been repealed (Chan, 2015)), and at a time when many of the local notions of normal social and economic practices were being questioned, the studio asked learners to think through ways in which design could radically intervene to offer local alternatives. Meanings of industrial design practice are invariably influenced by local circumstances: in Australia, our geographic isolation relative to the rest of the world; the shifting of manufacturing industries towards leaner and higher-value production; the vast distances between major population centres; and the relative affluence (Berry, 2015) of the Australian population each generate socially derived internal tensions and narratives that play out within the social discourses of students. These narratives and the politics that drive and challenge them are of course fleeting, so one aspect of the studio
was developing a deeper and longer-term position on the roles and purpose of industrial design in view of social, economic and environmental agendas for change. However, in adequately including these influences as conceptual drivers within a design project, students’ opinions of these factors provided an inadequate basis from which to generate useful design responses.

In response to this, the Quick Fix studio (taught in 2009) used methods of problem analysis that were unfamiliar to most students, but enabled socially derived positions to be tested (for detail on the studio see appendix .5). The use of a substantive literature base as a curricular device inside a design studio is an uncommon strategy; typically, students are tasked with gathering up resources that might inform design decisions themselves. Alongside literature in the area of design for sustainability, examples of the use of literature to

Figure 3.5 Quick Fix studio poster detail.
methodologically orient learners included the provision of a 2008 review of climate change in Australia that found that the country’s per capita greenhouse gas emissions are the highest of all Organisation for Economic Co-operation and Development member countries, (Garnaut, 2008). These concerns were used to provide a coherent background to the gathering momentum of the proposition of some form of economy-wide emissions reductions legislation, which would eventuate as the Clean Energy Act 2011. The carbon tax, as it came to be called, signalled a major shift toward Australia developing a carbon-constrained economy by placing a price on emissions, including CO2, as a means by which investment could be redirected toward cleaner forms of energy production and the transition of emissions-intensive industrial processes might be stimulated. Inferring the flow-on impacts to design practice of an emissions pricing mechanism set up an internal tension for the studio in which values of broad-based action on climate change sat discordant against pre-figured values of industrial design practice and its tacit drivers of activating consumptive materialism. The prospect of the Clean Energy Act 2011 meant that the increased cost for net emitters would be transferred into costs for businesses of all scales across the total life cycle of product manufacture, distribution, retailing, procurement, use and end of life. All businesses, including industrial design practice within a manufacturing context, would need to rethink their inputs and outputs and consider options. This macro-scale change was positioned as a narrative for speculation on new forms of practice for industrial design, as students raised questions as to the ‘right way’ to own, to consume and therefore to design if a new state of sustainment and adaptation to a structurally altered production economy was to be achieved.

20. The Clean Energy Act was passed by the Australian Government in 2011.
For undergraduate industrial design students confronting meanings of practice in these local conditions can be unsettling, both as a consequence of the complexity of the issues and because the design solutions generated can often fall outside of the conventional notions of legitimate industrial design practice. However, these tensions can, if approached with the right methods, result in incredibly rich learning and teaching experiences. Teaching future designers to be change makers, or to be cognizant of their changing professional and social landscape, requires considerable investment in the structuring of design projects, and the locating of projects within larger design research agendas.

When strategies to address unsustainability are matched with a design approach that focuses on end functions and the sociality of product mediated practices, product service systems (PSS) concepts often emerge as logical and locally deployable solutions. A PSS is a ‘a system of products, services, supporting networks, and infrastructure that is designed to be competitive, satisfy customer needs, and have a lower environmental impact than traditional business models’ (Mont, 2002, p. 3). Born out of business and environmental management discourses, PSS is one step towards realizing dematerialisation in society. While often not motivated by environmental concerns, services such as leasing schemes that retain organisational ownership of the product and allow control of the product’s entire lifecycle correlate well with emerging business practices such as extended producer responsibilities and resource preservation (Cook et al., 2006; Tukker & Tischner, 2006).

Exemplified in the product leasing service models of PSS, in which design is actively deployed to enable a closed-loop system, the original framing proposition of PSS was conceived as a way of effectively dematerialising the

21. ‘End functions’ denote the service.
nature of designed and manufactured products. These forms of PSS require particular scales and strictures of production, procurement, deployment and operation practices in the field, and have proved difficult to replicate within the Australian context. However, the Australian situation affords numerous opportunities for design to tackle over-consumption and the redundancy and duplication of products in the domestic and public domains. Projects in this vein often use PSS as a way of reconsidering how products are owned or might be exchanged. Product service systems such as car sharing (Meijkamp, 2000), photocopier leasing (Kerr and Ryan, 2001), carpet leasing (Anderson, 1998), toy libraries (Curtin et al., 1980), and emerging forms of collaborative consumption and redistribution markets offer businesses alternative markets and modes of operation. While often only functional at a very large scale, or as a centrally managed community asset, these models served as a way for students within the Quick Fix studio to re-conceive the normative and product oriented disciplinary ‘need’ to design a device to perform a certain task and the ‘solution’ mediated by a device, so that fewer products might be required to be manufactured and consumed, and design impact could be reformed through the provision of different types of service design enterprises. Design for sustainability activated in this way becomes a particular vehicle for motivation when students are enabled as dematerializing agents with a role to affect social and environmental change through design.
3.7.2.2 Propositional Projects Case Study: Silence and Other Ways

Silence and Other Ways (Figure 3.6) was a collaborative design studio with students from Industrial Design and Landscape Architecture (co-taught in 2006 with Fiona Harrison, RMIT University) working on the spatial and experiential dimensions of sound in the city. It had two key stakeholders: the City of Melbourne, and the Spatial Sound department of the Spatial Information Architecture Laboratory (SIAL) at RMIT University. The role of the studio was to experiment with ways in which experiences of the city might be augmented through sound-oriented spatial, material and technical interventions to complement formal research consulting arrangements between SIAL and the City of Melbourne. Through this studio (more detail on the studio poster can be seen in appendix. 6), students were required to let go of previously developed methods of approaching a project (through primarily visual means and at different scales) and were instead asked to listen to the spaces in the city as a way of finding opportunities for positive intervention through design propositions.
Studios that take students into completely new methodological frames present interesting possibilities for design innovation, but also tend to amplify pre-inhabited disciplinary boundaries. What emerged from this studio was the way in which methods of each field were transferred and adopted by students. For example, the modes of spatial appreciation used in Landscape Architecture was picked up and used by Industrial Design students, who developed projects that used various combinations of time and geospatial location to develop new forms of sound-based tourism experiences, whereas methods of design for use and making were adopted by Landscape Architecture students, who developed different forms of public furniture.
3.7.3 Speculative Projects

Speculative Projects revolve around fictitious (or obtuse) methodological interventions into a fictitious or far-in-the-future context of application. In this mode of project students exercise their imaginative, expressive and illustrative capabilities so as to project an alternate reality through designing. This mode, while unconstrained by the pragmatic imperatives implicit in authentic learning, often privileges the development of technique and technical discourses in that what is imagined needs to be conveyed through a set of disciplinary communication conventions.

3.7.3.1 Speculative Projects Case Study: The Oxen Project

The Oxen Project was an introductory studio for first-year industrial design students. Taught in 2006 it required the provision of a set of learning outcomes that would be immediately deployable into other studios. These included the capacity to interpret and act on a project brief, to undertake desk-based research, to understand the technical and manufacturing parameters of a reasonably complex product, and to generate concept visualisations and 3D sketch models. With these introductory studio projects, an existing product type is often used as a point from which a process of redesign can be commenced and understandings of users and use contexts can be developed. In the Oxen Project the product type used was a two-wheeled walking or pedestrian tractor. A narrative around this type of product, common in rural contexts throughout Asia, was constructed; it focused students on understanding industrial design activity not for what product is designed, but for the affordances of products and their capacity for creative use and misuse. As a speculative studio, and in the absence of a specific external
client community, the Oxen Project asked students to infer interactions with a product type that was unfamiliar to most students. This was done through a combination of visits to farms and farming equipment suppliers in Australia, building 1:1 representational models to test and refine physical and operator constraints, and the development of concepts around specific applications for the walking tractor. The walking tractor’s small environmental footprint, low production cost relative to even the simplest four-wheeled tractors, and its extreme versatility have meant as a product type it is ubiquitous in many rural parts of Asia. Applications for this type of tractor include being used as a tractor to pull trailers, as a plough, as a pump and as a generator. Through this process the idea of an outmoded, fairly rudimentary, and often dangerous product was reappraised, and its inherent values were identified and leveraged through the concepts developed.

3.7.3.2 Speculative Projects Case Study: This Side of Pinnaroo

This Side of Pinnaroo (Figure 3.7) was a collaborative design studio with students from Industrial Design and Landscape Architecture (co-taught in 2007 with Fiona Harrison, RMIT University). The studio was constructed as a means by which to survey changes to rural economies and environments through a combination of desk-based research, field research, collaborative design activities and the generation of propositions for design intervention (Appendix 7). Arranged around a combination of fieldwork based in the Mallee town of Hopetoun and excursions into the rapidly changing and drought-affected western Victorian wheat belt, the studio sought to open out for design the challenges of rural economies in transition.
Students were tasked with a series of small design projects that revolved around slowing down the process of determining solutions, including the design and construction of pinhole cameras and the making of field journals. This was seen as a means by which disciplinary-defined methods of practice between the two groups of learners could be augmented through the collective generation and testing of alternative methods of practice. For instance, fieldwork activities were framed around notions of participatory rural appraisal (Chambers 1997) and the nature of final design responses were largely left to students to determine and defend through both an exposition of their research findings and the methods by which they (individually or collectively) worked to define new methods for practice. Students spent time with the community, listening and registering points of conflict, in order to devise small ways in which designerly thinking might offer new opportunities.
3.7.4 Live Projects

Real-world or Live Projects see learners undertake authentic methodological and design interventions into authentic or actual contexts of application. In the case study presented below, the students responded to the needs specific client communities through design to enact an actual intervention into an actual context. This mode, while closest to professional activity, demands (from learners and teachers) particular attention to ‘soft’ and generic skills. The complexities of such authentic projects frequently require learners to work in project teams, in which individuals take on specific roles in order to collectively deliver plausible design outcomes.

3.7.4.1 Live Projects Case Study: No Fixed Address

In 2010 a collaborative studio called No Fixed Address (Figure 3.8) with industrial design and interior design students (co-taught with Lynda Roberts) was developed with The Social Studio (22), a local NGO that trains refugee communities for employment in the fashion and textiles and retail industries. Students worked in teams to design two bicycle-based mobile retail outlets; they were developed through extensive stakeholder consultation, prototyped and put into service (Figure 3.9).

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22. Alongside its training mandate and social inclusion agenda, the Social Studio follows a range of Design for Sustainability (DFS) principles, including the remanufacture of surplus fashion garments and the use of surplus textiles: http://www.thesocialstudio.org/
These ‘bike shops’ travel to events or trade on the street and function as the product component of a much larger community cohesion, education and social-service provision agenda, and require a fraction of the inputs of a conventional shop while performing the same service. This studio saw students design and produce immediately deployable items of capital equipment, through a combined process of understanding and designing for the specific (and in this case unique) needs of the client, managing client relationships, and negotiating and managing a design fabrication process for real-world application. More detail of the studio can be found in appendix (8).
The structuring of fictitious and authentic elements of a design project can be seen through a series of design studio projects undertaken in the area of design for diabetes, undertaken between 2006 and 2009 at RMIT University with several cohorts of students from various year levels (Varadarajan & Fennessy 2011). It is common for undergraduate industrial design students to work on projects that involve clients or stakeholders from outside the university, and in subject areas that deal with real-world and often intractable problems. However, when the real problems of real people become a location for disciplinary education it can have uncertain outcomes for learners and educators alike and can lead to a retreat into conservative approaches to learning and problem solving. In response to this situation, a particular

3.7.4.2 Live Projects Case Study: Diabetes Projects

The structuring of fictitious and authentic elements of a design project can be seen through a series of design studio projects undertaken in the area of design for diabetes, undertaken between 2006 and 2009 at RMIT University with several cohorts of students from various year levels (Varadarajan & Fennessy 2011). It is common for undergraduate industrial design students to work on projects that involve clients or stakeholders from outside the university, and in subject areas that deal with real-world and often intractable problems. However, when the real problems of real people become a location for disciplinary education it can have uncertain outcomes for learners and educators alike and can lead to a retreat into conservative approaches to learning and problem solving. In response to this situation, a particular

Figure 3.9: 'Bike shops' for The Social Studio.
rationale and methodology and pedagogy for project-based learning in the
case of people-centred design intervention for diabetes was developed.
This approach elevates the civic dimension of learning, often de-emphasized in
technically oriented curricula, as a driver of design activities in people-oriented
design contexts. As a collection of studios over several years, the Diabetes
Projects predominantly resided in the Live Projects mode of the FAT model.
However, each used various aspects of other modes to orient itself toward
particular ways of thinking about how industrial design activity might intersect
with a complex public health phenomenon and the very real needs of affected
communities. To do this a process of critique of dominant producer-side
thinking was undertaken, in which industrial design was conveyed to learners
as a discipline fundamentally concerned with enabling people, as discrete
communities of need, to improve their daily experiences. Where designers
work outside the producer and manufacturer context and alongside other
disciplines such as social work and sustainability, the notion of ‘community’
is positioned as a legitimate site of research and real-world problem solving.
Projects located in the community area are often aligned to tough and
intractable problems (Kahane 2004), and require an exploration of the
complexity in people’s everyday lives. However, in fields of design education
and practice that focus directly on the needs of people and communities,
conventional material-centric and producer-side modes of design thinking are
inadequate. Projects that tackle issues such as obesity, poverty, the peripheral,
the young and the infirm – often marginal in dominant design discourses
(Najman and Lupton 1995) – demand a design capability that is different to
that enacted in normal practice. Stakeholder participation is used as a way for
students to focus their attentions on ‘the problem’ as opposed to finding ‘the
solution’, so as to explore real issues, and to propose alternative ways forward
through designing. Through such engagements the marginal socio-material-technical discourses of a community (often marked by as a point of irritation) can be amplified through design engagements so that people’s stories dominate interactions and individuals’ needs are taken seriously.

For novice designers, making the conceptual transition from tacit notions of design activity being predicated on the development of a thing for manufacture, to that of navigating the real needs of people can be a complex, unfamiliar and confronting process. Expert perspective in areas of health elevate anxieties for students to fulfil their own expectations of what a community might want from the engagement. This exacerbates in the student a feeling of being ‘the other’ in the situation and for some students there are degrees of guilt associated with finding opportunities for personal development in the difficulties of others. For others the management of time and the appropriate choice of methods is challenged by this mode of socially situated problem solving, as the priority is largely one of dealing with the problem on the ground and not the speculation and proposition of a designed solution from outside of the situation.

Performing with confidence in the people-oriented and nonmaterial contexts of community-based design projects requires learners to challenge prefigured expectations of what design is and how it is practised. This dialectic between the real needs of people and preset notions of designing sets up a particular dynamic for the design educator in which the tacit knowledge of what it might mean to design, and presumed identities of the designer, are brought into question and teased out with students. A critique of design that problematizes conventional paradigms of the practice and the continued failings of the discipline to adequately service the needs of those who could really benefit from design intervention (Bonsiepe 1977), (Bicknell and
McQuiston 1977), (Papanek 1985) often arises. This critique highlights the dominance of conventional producer-biased design thinking that, as a kind of expert discourse, limits meaningful learning from communities by sidestepping the often rich narratives of people and their notions of what ought to be. Arriving at and contending with such a critique can undermine previously held ideals of the efficacy of the discipline and its ability to produce material solutions to commercial and technological problems that deal with the real needs of people.

Live Projects can result in students feeling that they have not done enough to satisfy their desires to solve the problems of the communities engaged. This, in turn leads to a questioning of the authenticity of designed outcomes, and the limitations of designing from within the relative safety of conventional modes of practice. However, with appropriate methods for negotiating the practical realities of involving undergraduate industrial design students in real-world community problems design education can offer an alternative to the normative producer affiliated modes of practice.

Viewed this way, the bringing together of the authentic and fictitious forms a general typology for industrial design curricula that occurs through a project-based format. As topics for design are mostly ephemeral or arbitrary, the typology operates in such a way that any topic can be overlaid and interchanged. While useful in formulating either a topic for design enquiry or pre-structuring particular methodological or contextual immersions in the development of a design studio project, one of the problems with the FAT model is that it is predicated on the educator predetermining ways in which disciplinary meaning is made. The idea of the studio as a site for teaching, learning, research and the application of knowledge in practice is, for design, what ‘the field’ is for the social, biological and statistical sciences.
It is a pedagogic site that is often so generalized that discussion of it in the absence of the specific orientations of a particular disciplinary episteme is problematic. However, as studio projects are adaptive to contemporaneous conditions they are rarely repeated, and present students with new and often unfamiliar methodological and contextual learning through actively designing. Often framed around particular discourses in design, product typologies or engagements with external clients or users, the novel nature of each studio project presumes the learner is open to the newness of a project and has a technical and conceptual capacity to function within it. Consequently, studios require of learners the assembly and reassembly of notions of the self in practice in relation to both the particulars of the given project and the broader influences of culture and context before and beyond formal education in design. Methods of pre-orienting learners towards an adaptive sense of practice in education, such as the FAT model for design studio construction, constitute one strategy for achieving this aim.
3.8 Studio Pedagogy as a Means for Disciplinary Adaptation

“designing material and non-material and technological things and/or systems and/or experiences, through a mix of analogue and digital mediums of representation and documentation, creative, strategic and evidence based thinking and research processes across the spectrum of value within capital and consumer markets, for global and local production and distribution, for localised utility including aesthetic utility (which when distributed at scale across a community of users elicits further information, and constructs new material/technical/system/experiential dependencies for the design of future variations of the same and for other material/technical/system/experiential artefacts), and for specific agendas including but not limited to; efficiency, affordance, entertainment, inclusivity, interaction, informatics and often for correcting or mitigating problems caused by previous and associated outcomes of industrial design, that take temporal, two and three-dimensional forms that are generally smaller than a house and usually not explicitly an advertisement, in view of either increased materialism or de-materialisation for economic and cultural exchange through various sectors of a society as outputs of mass/batch/micro/bespoke manufacture! “

Not very helpful.
The industrial design discipline, primarily through the activities of the
design educator, has and continues to be created and recreated by the strategic
grouping and aligning of sets of independent and often epistemologically
distinct knowledge domains. Explaining this breadth can be a challenge
for the educator and confronting for a learner and various strategies get
deployed in my practice including textual prompts (see Figure 3.10). This
grouping and aligning has, for the best part of nearly two centuries, been
largely oriented toward changing national industrial and social priorities,
and often for the explicit purposes of influencing capabilities within local
manufacturing sectors. As industrial design education becomes further
integrated into universities, the capacity for designers as academics to teach
with old models is challenged. Institutional contexts, their structures and
strictures co-construct the conditions of educator identity that are permissible
and practicable. The combination of academic research into, through or for
professional design practice, where scholarship informs and forms out of both
designing and teaching design, presents a particular practice identity: the
designer as academic. The design academic works between teaching, research
and practice, and often attempts to integrate the two. This shift has seen an
the generation of new discourses for industrial design, and provided a return
to a public discourse that contests the roles and meanings of the discipline
within its contexts of application. This continual but often tacit addition of new
fields of knowledge in order to equip designers with capacities to influence
these priorities is no surprise. Throughout its development, the long-held
underlying ideological framing of industrial design as a practice that sits as
a contrived temperance between the developmental, civic and humanistic
ideals of industrialization and its totalizing potential has been retained.
For the designer-educator, the discipline is re-rendered from the pragmatic
manufacturing and artefact discourses of commercial practice to being a discourse that advocates between realities and potentialities, between societies and their technologies, and between the positive and negative implications of production and consumption.

This notion of industrial design as a discipline that advocates ‘between’ potentialities and actualities can be seen as a criticality that traverses the technical, aesthetic and developmental paradigmatic conditions of industrial design and Western educational paradigms: the positivist, interpretive and critical. The role of advocacy, or care for those affected by the outcomes of design is critical to the practice identity of the industrial designer. From ‘what’ and ‘whose’ position the designer advocates is deeply informed by the school of thought and paradigmatic condition from which the designer has modelled their professional identity – be it about improvements in the daily lives of people through their material interactions, or through more labour-friendly specifications for product manufacture. It is this role of advocacy that elevates industrial design as a critical practice. This criticality of approach, and the capacity through a practical agency of advocacy, to move through and between practice discourses, performance archetypes, theory and condition ties the educational, research and professional practice of the industrial designer together. In this interplay between the ongoing inclusion of new fields of knowledge for a changing practice landscape and the ideological orientation towards advocating for new and better socio-technical worlds, the epistemological underpinnings of industrial design as an educational frame see the retaining of two core epistemological threads: the technical and the poetic.

The poetic thread sees meaning construction in design entered into through a continual returning to the disciplines of arts and crafts and material culture traditions. Now complicated by the inclusion of digital and technologically
mediated media and techniques for designing, and through a recent elevation of do-it-yourself and hacker-derived socio-material discourses, the poetic in industrial design education is concerned with experience as a ruminative domain. It differs from poetics discourses in contemporary art and craft practices, in that meanings of practice for industrial design are still largely conveyed through the impacts that artefacts have as outcomes of practice, and not through a focus on the activities of practice. The technical position draws on discourses of production, utility and efficiency and locates industrial design as a non-expert technical practice. The technical for industrial design spans the ways in which design activities are done, to the ways in which designed things are produced and distributed, through to the ways in which things and systems operate in people’s lives.

In the late 20th century these two positions were perhaps most fully defined for education in the British approach to reconstructing industrial design education within two domains: three dimensional and object design, which focuses on poetics, and the technically focused industrial/product design engineering. It would be comforting to think that these positions for industrial design education are the product of considered thinking at a university and industry level about the future needs of a discipline for national or regional priorities. However, it is more likely that they emerged principally through the cycling of designers between professional and industry practice and teaching, and through the reflective and career redefinition opportunities afforded by teaching and researching within a university context. Such a context of engagement provides the space to consider individual meanings of practice at both micro and macro scales through propositional and critical ways often inaccessible in the reactive middle ground of commercial design practice. What has emerged through this cyclic relationship between
commercial practice and academia in industrial design is an ability to construe the discipline as a coherent whole by virtue of its inherent interdisciplinary. Industrial design can be conceptualized as merely the stringing together of knowledge practices from other technical and poetic fields; this stance implies that industrial design as a practice and as an education is only and always a palimpsest of others. For pedagogy, such a reading immediately brings into question the default and presumed meanings and strategies of practice.

For the design educator as academic, the studio functions as a fertile site for the adaptation of future practice to changed disciplinary circumstances in order to induce new methods for practice, and new constructs of practice. As studio projects involve a full spectrum of design activity from problem setting to solution and function as the central curricular element of industrial design education, they are an opportune site for such experimentation. Similarly, they offer a mechanism by which the differences between design as a creative discipline and empirical academic disciplines can be amplified in order to legitimize the inherent interdisciplinary nature of industrial design. Within the institutional frameworks that have traditionally privileged disciplinary and epistemological domains through their organizational structures, industrial design often sits awkwardly – between the fields of the fine arts, architecture, engineering, the social science and business. This rather ambiguous location presents the industrial design educator as an academic with an open field to define and redefine the practice – its subjects, themes and topics – in their own ways. However, the ambiguity of locations for meaning in industrial design can either be seen as a consequence of a discipline still searching for codification, or as a disposition towards inviting continual rupture and redefinition.
To appreciate the disciplinary expressions and pedagogic tactics described in the previous chapter, it is useful to acknowledge the influence of material-semiotic methods in current disciplinary theory and thinking. Learning to contend with and be accepting of emergent and tangential disciplinary expressions that fall outside of the conventional ambit of industrial design practice and pedagogy is critical to the progression and adaptation of professional practice and theory for design. Industrial design, being a multifarious practice, draws on knowledge from many fields and disciplines. While lacking the nuanced appreciation for the diversity of disciplinary meanings that develop through formal study and professional practice, popular external understandings of industrial design are pervasive. Through their pervasiveness pre-construct certain legitimacies for practice. Industrial design’s boundaries are therefore in part determined and pre-inhabited from outside of practice.

While the pedagogies encountered in education induct students into particular disciplinary ways and practices, the habitation of disciplinarity is for many students arguably both prefigured and projected. This phenomenon prepares conditions of self that precede formal education and form as particular professional or practice identities that are then recursively acted out in education, effecting an image of what future practice will look like: a particular choice to ‘be’ through education rather than ‘become’ that can be seen as a simulacrum that is validated by the practical and situated nature of designing as a way of learning to design. These negotiations of notions of practice directed towards a habitation or habitus of disciplinary knowledge
and discourses form in design education as a praxis that preoccupies itself with developing new ways to intervene in current states of being and doing. This process of negotiating the now, the next and the after is important in industrial design education, which by its nature is continually seeking to bring transformations to the material practices of others through the design of new products and services, and through the proposition of alternative socio-material futures.

From this perspective the trans-disciplinary and transgressive concerns that have so diffused industrial design curricula over the years begin to carry a different meaning for design education than simply as a response to technological developments or contextual changes. They begin to point towards a tacit reckoning of education for post-disciplinarity, and in doing so require the designer and educator to function beyond their own disciplinary identities and their own habits of mind. Educators in industrial design frequently confront the discarding and replacing of outmoded disciplinary ways of knowing and acting, while simultaneously working to retain and fortify long-held epistemological positions. Forming as a dialectical engagement between teacher and learner this becomes a problematization of the positions by which disciplinary habits have been established. Orthodoxies of practice, methods of inquiry, motivations for designing and dominant histories of industrial design become spaces for new interpretations and new meanings for design. New meanings of practice bring forth new territories for practice, and new territories for design require a reassessment of the place of practice and its implications within such territories. These processes demand an explication of the discourses and institutions that design seeks to co-inhabit inside education, and thus teaching becomes a location for critique and ultimately rupture to free new and alternate legitimacies of practice.
This chapter focuses on two models for curriculum development inside industrial design that broach issues of disciplinary change. The first model centres on the implication of design as a key device in the construction of practice. The second model offers a temporal structure for the development of design projects in ways that privilege reflexivity in learning and designing. Combined, these models are used as a means of enlarging design enquiry, and are discussed in relation to design studio projects undertaken at RMIT University in the area of design for diabetes. The chapter then moves from this topic to the process by which new implication-focused territories for design through education can be developed via a reflective case study of teaching and supervision in the domain of social and sustainable design. To interpret these pedagogic approaches, the chapter commences with a framing of industrial design education and its inclusion of concepts and methods from the field of science and technology studies (STS), and specifically from the various branches of Actor-Network Theory (ANT). A synopsis of relevant ideas from ANT and other material-semiotic methods is given and related to the activities and outputs of industrial design.
Uncovering the systems that sit behind the technical and social concerns of industrial design constitutes a major component of the interchange between teacher and student and is a core activity of pedagogic methods in the field. While the emphasis of the industrial designer in tackling issues of experience have changed over time, making, selling and using, as socio-technical concerns of industrial design form a particular disciplinary narrative. Each of these - making, selling and using - is more accurately described as striations of concern for design; importantly, they ought not be interpreted as a stratification of concerns, as that would imply a hierarchy of value, thereby overly simplifying the inter-relations of each in the ways in which designers deal with the complexity and totality of a socio-technical situation. These striations are almost always evident in the approaches that designers take and in the ways designers are taught to apprehend a problem: to see phenomena and to posit solutions or interventions into a problem space. Each has its own utilitarian and aesthetic discourses, and each is apparent in the other. For instance, the durability of a product – say a bicycle – is an outcome of the designer’s ability to make durability and the capacity for repair saleable values. Such values are contingent on the material and production specifications (including the quality of assembly and the distribution and availability of replacement parts, or the expertise required for service and repair) and impact the product’s saleable value. The actual durability of the bicycle, as a market and material virtue, is only as good as the designer’s capacity to understand (and in some cases predict) the nature of its usage, and the use-value that is ascribed to the product by those that actually use it and by those that aspire to use or own a product with such values.

4.1 Material Semiotics and the Seeing of the Situation

Uncovering the systems that sit behind the technical and social concerns of industrial design constitutes a major component of the interchange between teacher and student and is a core activity of pedagogic methods in the field. While the emphasis of the industrial designer in tackling issues of experience have changed over time, making, selling and using, as socio-technical concerns of industrial design form a particular disciplinary narrative. Each of these - making, selling and using - is more accurately described as striations of concern for design; importantly, they ought not be interpreted as a stratification of concerns, as that would imply a hierarchy of value, thereby overly simplifying the inter-relations of each in the ways in which designers deal with the complexity and totality of a socio-technical situation. These striations are almost always evident in the approaches that designers take and in the ways designers are taught to apprehend a problem: to see phenomena and to posit solutions or interventions into a problem space. Each has its own utilitarian and aesthetic discourses, and each is apparent in the other. For instance, the durability of a product – say a bicycle – is an outcome of the designer’s ability to make durability and the capacity for repair saleable values. Such values are contingent on the material and production specifications (including the quality of assembly and the distribution and availability of replacement parts, or the expertise required for service and repair) and impact the product’s saleable value. The actual durability of the bicycle, as a market and material virtue, is only as good as the designer’s capacity to understand (and in some cases predict) the nature of its usage, and the use-value that is ascribed to the product by those that actually use it and by those that aspire to use or own a product with such values.
For the designer, aligning these striations is a very complex task. It requires more than simple knowledge of the material, technical or stylistic dimensions of a particular product under design. It requires an appreciative capacity to read the complex social, institutional and contextual circumstances into which the product is produced, distributed and ultimately used. Within this narrative, designers themselves play different roles: acting as advocates for the quality of user experience or the experience of the worker that is required to manufacture a product against the pressures that come from market-driven discourses of efficiency, profit margins and commercial strategies of continual production for re-consumption. Some designers do this by amplifying their own values, or the values of design as an identity that is critical to the sale or branding of the product or service, while others do it with relative anonymity, preferring instead to incrementally chip away at the point and purpose of a product or practice in pursuit of greater degrees of alignment. Indeed, aligning these striations constitutes a holy trinity of sorts for design, and given the complexity of the commercial, social and production systems industrial design operates in it is perhaps surprising when a design project manages to get the mix just right.

The aim of production in the first phases of industrialization, that in turn opened the door for designers who could look for new opportunities (both stylistic and technical), was very often tied into broader projects of urbanization, as societies saw the benefit to peoples, their polity and economies in moving away from largely agrarian modes of existence. Early incarnations of industrial design, as a new breed of artisans, tended to use design as a way to deal with improving the conditions of labour in the manufacturing of products through the design of systems and standards of part making and assembly. In these early phases of industrialization and urbanization, the
focus for governments and companies was very often on national and regional priorities, and the aim (perhaps a hangover from agrarian economies) was one of complete and local subsistence. Developing economies the world over attempted to set in place complete urban industrial systems, and central to doing this was tapping into cultural and aesthetic values that pre-dated the modern push. Out of this we see the systemization and scaling up of local craft or manufacturing traditions such as the development of the Scandinavian furniture industry, or the transition of steelmaking to steel product making in Britain. In the Australian context, the transfiguring of sheet metal industries developed in the first instance for agricultural and construction industries, then for munitions and military equipment manufacture, and then into automobile and domestic appliance making. While this orientation to the place and purpose of design in society (or in the social concerns of industrialization) were prevalent in the 19th and early 20th centuries in what we would now see as developed Western economies, it is a narrative that is still being played out in economies that are making the transition from agrarian to industrial economies such as Indonesia, China and Mexico, to name a few.

When valued, such an approach achieves several outcomes within an urban society. It retains and develops the skill sets of a local workforce over time, it draws on and reifies a community’s historical affinity with particular materials, processes and locales of production, and it allows for the development of community identities, be it through the collectivization of identity through kinds of labour, such as guilds or trade unions, or through the individualization of identity made possible through the availability of material and aesthetic choice. These activities of meaning making within complex socio-technical systems, and the philosophical and political thinking that was developed to exploit or direct the flow of capital and labour, are of course not new ideas.
As manufacturing workforces are also consumers of the products that they produce, their conditions of labour invariably creep into the meaning and value that is ascribed to the goods made. Urban populations need homes, food, utilities, mobility and complex systems of support, including entertainment and resources for identity making. The making of identity, or more precisely the acquisition of the materiel from which identities can be made, marks an important phase change for design, when it began to move from its preferences for utility and experience in production toward the commodification of the narrative of use as a socio-cultural marker.

A way of seeing into the socio-technical complexity of the design enterprise in view of learning, finding and setting problems and opportunities to develop solutions is offered through ANT and its various branches. As a branch of STS and the history and philosophy of science, ANT offers design thinking and pedagogy a set of frameworks for apprehending the inherent complexities of the systems with which their designed products and services seek to engage in order to maintain or to disrupt the status quo.

Actor Network Theory emerged from a convergence between knowledge and research traditions in the fields of STS and the accounting of heterogeneous material-semiotic relations so central to post-structural theory in the early 1980s. The key protagonists in the articulation of ANT as a new method for understanding complex technical systems and their political, social and operational elements were Bruno Latour and Michel Callon, based at the Centre de Sociologie de l’Innovation at the École Nationale Supérieure des Mines de Paris. Their community of ANT practitioners grew, and throughout the 1980s deployed ANT as a means of analyzing socio-technical systems for a variety of purposes. Critical to the uptake of ANT was Latour’s description of the theory (or method, as it is more accurately defined) in his book Science
While largely confined in the 1980s to sociology, *Science in Action* subsequently broadcast ANT into a range of other disciplines including organizational theory, health and community studies, anthropology, education and economics. The lack of orthodoxy of ANT permitted wide adoption as an adaptable set of methods for translating the complexities of social and technical systems for the purposes of planning, policy formation and innovation studies (Law & Hassard, 1999). These adaptations and refinements carry a variety of names but are often referred to as ‘after-ANT’, and include theoretical and methodological variants such as Social Construction of Technology (SCOT) (Bjiker, 1997) (Bjiker, Hughes, Pinch & Douglas, 2012) and Social Practice Theory (SPT) (Shove, Pantzar & Watson, 2012).

In many ways ANT eludes description as a ‘capital T theory’ in any hard sense. While focused on ways of thinking through and thickly describing the social and technical interactions of a complex situation, it quite deliberately sidesteps attempts to singularly define or explain how and why a situation is the way it is, or to predict what it might become. For ANT all situations are necessarily complex, and the degrees of complexity are determined largely by the boundaries and multiplicity of foci that the researcher sees fit to inscribe onto the situation. Due to this the ‘researcher’ and their methods and means of research become actors in the network or situation under study, and in being so alter the state of the situation through study. This dimension of ANT aligns its approach to ethno-methodological forms of social research and importantly to the types of praxis interventions, tactics, modes of action research and innovation practices that define many of the activities of industrial design. Like the concerns of industrial design, ANT has typically focused sociologists on the examination of quotidian (even mundane) socio-technical systems, and in doing so produces, with the use of a variety of tools, a descriptive map
of the terrain of a situation, its common and unique activities, its habits and hierarchies, its procedures and its tacit or implicit discourses, in order to comprehend what the system is, who and what its actants are and how it (as a system) is sustained over time in particular contexts. ANT tries to ascertain what a situation is from multiple perspectives or points of focus, and it makes a clear distinction between its ‘theory’ as an activity of description as opposed to an act of explanation.

At the centre of ANT is the concept of a generalized symmetry of actors located as inter-contingent within a network or system of relations. Actors are both human and non-human – people and things – and have continuously regenerated relationships that are deformed through the transportations or interactions between actors and the multiplicity of translations of meanings and values within the network by its actors. When seen as combined or inter-dependent (networked), the human and non-human actors become temporarily semi-formalized within the network as actants; actors are what they are because of their relationships with each other. The aim within an ANT analysis is to consider the human and non-human actors as of equal significance (but not of equal power) within any network, and to look for how the interactions and relations between them make and re-make their specific differences. This concept of the network as a site for the making and re-making (Latour, 2005) of relations between actors underpins the inherent transience and performativity of actors in any network; the relations between them need constant and repeated maintenance to keep the network a network and to prevent the breakage or erasure of relations. In simple terms, actor-networks are sets of social relations between people and things that are always and only ever being made and re-made. As sets of social relations an actor-network is neither static nor coherent, and its entities or actors can often be seen as being
in various states of transportation, conflict and re-negotiation. As the ‘network’ in ANT is always in a state of alteration, it has

…no a priori order relation; it is not tied to the axiological myth of a top and of a bottom of society; it makes absolutely no assumption whether a specific locus is macro or micro and it does not modify the tools to study the element ‘a’ or the element ‘b’. (Latour, 1996 p.5)

The distinctions between the many states of an actor’s actions are described within ANT as being either intermediaries or mediators. The relational performances of intermediaries are largely predictable and tend to have little influence on the transformation or alteration of the network and its internal meanings. Mediators, on the other hand, are seen as net multipliers of difference or change within a socio-technical system. They are both unpredictable and transformative in their relations with other actors, and given their transformative power tend to occupy the gaze of the ANT researcher. Both intermediaries and mediators are a part of any network, and while an intermediary in isolation rarely offers the ruptures that a system of change requires for its continuance, they can and do morph into the state of mediator when the system is disrupted, particularly with the introduction of new socio-technical actors.

For industrial design education, ANT is tremendously useful in two main ways. The first is that it offers a means of enlarging the narrative that sits around a design problem. The second is that it provides a method of approaching complex socio-material systems to look for opportunities to disrupt through design in view of impacting on the implications of the status quo of a situation: to see a situation as a system that is able to be made mobile.
Given the intensity of learning that happens in a studio project, there is rarely space for the inclusion of either the individual or the collective as a site of legitimate inquiry unless the social dimension of learning is positioned as the context in which the project’s authenticity is based. This is quite different from the types of inquiry-based learning within fine arts education, where notions of the self as the subject of ontological inquiry are uncovered through disciplinary practice. Rather than position the self as a legitimate and authentic part of learning, industrial design pedagogies have, unwittingly or otherwise, evolved to largely avoid any real and systemic inclusion of the construction of individual identity as a deliberative product of learning through either real-world or imagined contextual inquiry. In the past few decades various models of reflective practice have been tacitly integrated into the curriculum but often applied as an appendix activity to the completed inquiry, thereby leaving little room for the development of reflexivity in action. Consequently there is embedded in the generalised curriculum an implicit sense of what a designer is, and an expectation that learners pre-identify (or rapidly attain) such a disciplinary script, thereby disallowing any significant deviation from that implicit and archetypal identity.

However, given the constant engagement of learners in activities that are both challenging and unfamiliar, industrial design studio projects frequently require learners to operate way outside of their current capabilities and to cooperate with both their peers and their teacher in order to build new knowledge and skills. These collaborative dimensions of design studio projects are possibly more a product of the pragmatic need for learners to develop functional approaches in dealing with the inherently interdisciplinary nature of
industrial design as a practice within other systems of practice than purposeful pedagogic strategies for learning. The use of the topicality of implication as a pedagogic tactic provides a potential praxial bridge to deal with the need for education to enable critical and reflexive learning outcomes.

Design studio teaching often engenders a need for deployable models to assist in explaining the often-fuzzy notion of a design project and its moments. For the educator, making sense of the inhabited relations between design discourses and educational performances apparent in a project – through the development of theoretical and temporal models – constitutes a key pedagogic performance. Model making is at once constructive and reflective, and provides a mechanism by which particular design activities can be scripted and the implications of those activities for learning can be appraised. Often the making of models forms a diagrammatic act within the moments spent with students, or in thinking through ways in which complex subject matter might be better conveyed to learners.
4.2.1 Case Study: Immersion, Exploration, Intervention and Demonstration

Through a series of design studios undertaken between 2006 and 2009 in the field of design for diabetes, students were asked to consider the complexity of the diabetes problem from the position of those living with and managing their condition. A community-oriented and people-centric disposition to design was required to draw learners away from methods and locations for design with which they were comfortable, such as reacting to the needs of a manufacturer or responding through the incremental redesign of existing products and services in the health management domain. Through the experiences of project work done with diabetes communities, it became evident that achieving design innovation in the educational context is not necessarily systematic or capable of being bounded within current methodologies in design practice. An alternative methodology of design was needed to provide reflexivity in learning to strengthen the ability of students to manage often-confronting concept demonstrations to people with a strong stake in the work being done; privilege collaboration with communities which have complex problems that cannot be solved through any singular, material or technological output; and support reciprocity between students and community stakeholders when those stakeholders want outsiders to approach their issues without prejudice.

It became apparent that a specific model or method for structuring projects was needed to give students and participating external stakeholders a clearer understanding of the scope and outcomes of this type of design studio. A four-stage design process named ieid(c) was developed (Varadarajan, Fennessy et al. 2007; Varadarajan, Fennessy et al. 2009) that allowed students to set aside a priori knowledge and expectations of design practice and its processes.
The stages of ieid(c) replaced structured processes such as research and design development with a requirement of ‘immersion’ and ‘exploration’, in which embodied and experiential knowledge was privileged over the textual and the tacit. A stage of ‘intervention’ ensured that design solutions went back into the community for validation through field testing. A final phase of ‘demonstration’ saw the establishment of a new enterprise and its material so as to give life to the design solutions.

Empathetic approaches to problem solving and the elevation of conventionally marginal discourses, such as designing for people living with diabetes, defined this approach as an authentic and situated capacity building exercise for students (Chambers 1997). While conventional modes of industrial design education do enable students to acquire higher-order skills such as empathy, projects that require a direct relationship between the learner and the community provide a space where the impacts of empathy on design decision-making can be seen and validated and not simply supposed or inferred through a post de facto ‘reading’ of a design proposition. The ieid(c) methodology (see Figure 4.1) was deliberately designed to maintain
conventional design practices with the transmission of textual, visual and material outputs that included the sketched concept, refined illustrations and the model as material narratives that ‘talk’ to the collaborators (Kuhn. 1970). These activities were structured for students as a means of refining and communicating findings via a set of distinct research methods and participatory processes aligned to each stage of the project. This process of including a temporal sequence or staging in a model for learning provided a framework for guiding students’ learning experiences as well as serving as a time and task management tool for learners to negotiate the often ambiguous and unpredictable real-world contexts in which the diabetes projects took place.

This model, designed for a very specific type of studio in which learners worked alongside the stakeholders from highly diffuse diabetes communities to imagine new futures for technologically and materially mediated condition management, was subsequently used in other studios that had different thematic framings and the need for different methodological inputs. Sometimes it was effective and other times it proved insufficient. When it failed it was often due to the inability of the model to adequately orient activities within contexts different from the one in which it had been developed. With an issue like diabetes there is an enormous amount of goodwill shown to the student from the stakeholder community, where difficulties with current systems of health management are clearly accepted as a design problem. The contingency of pedagogic models to their contexts of application is fragile, and it is quite common to develop new models for each project.

The making of conceptual models to sequence activities and to condense the complexity of theory into practicable forms is undertaken in most fields. While often ephemeral, or practicable in specific situations, the making of models to reflect or to direct activities in ways that yield positive learning is a
defining practice for pedagogy. The following sections of this chapter describe two generalizable models developed through teaching and used across a wide variety of design studio projects. The first concerns curricular and project design and centres on the role of the construction of research and practice narratives. The second concerns the temporality of doing a design project and the need for particular stages of reflection in action.
Connecting a community of learners into a practice of design that is responsive to both the capability development of individuals and their collective capacity requires specific approaches to the development of curricula. In the kinds of thematic, topical or implication-oriented design studio teaching that is increasingly deployed in industrial design education, the actual design outcomes that learners arrive at can be unpredictable for the design educator and student alike. Design project outcomes and the research and design activities in which learners engage, while able to be broadly defined under specific design methodological umbrellas, are not always enabled by curricular models that proscribe particular sequences of activity for the learner. With such sequencing it is difficult to meaningfully cater to individual capabilities or the collective capacities of a community of learners. Planning for learning outcomes through a design project that is implication oriented is a complex process for the design educator: the thematic terrain and ways forward for designing within it need to be surveyed and then conveyed through a project structure. As thematic, topical or implication-oriented design studio projects leave open the design outcomes for learners, being able to see the kind of learning path that such a project might demand is important. For the educator this kind of planning provides a way to give adequate consideration of the complexity of the theoretical and practical terrain, the starting capacities of learners, and the logistics of undertaking a largely open-ended enquiry that will yield appropriate capability development.

Thematic, topical or implication-oriented design studio teaching is underpinned by a belief that for design to actually confront the implications of its practices, or to enter into fields or problem areas in which design might
have no clearly identifiable currency, a capacity to think in divergent and holistic ways is critical. A privileging of divergence is counter to many of the established methods by which design projects are structured; they typically use an approximate of the commercial phases and stages of the delivery of a design project as a template for curricula. Such approaches, when used in the absence of a clearly framed design problem or output, typically steer students towards convergent responses too early and thus limit the potential of learning. While enabling technical or methodological competence, the use of normative models can prevent a learner from properly connecting their disciplinary development to broader theoretical, historical and social concepts in ways that generate new approaches for practice. Convergence is of course essential at some stage in the design of a product or a service as a plausible solution to a fuzzy or ill-defined problem, but as an already inherent inclination for design it does not require the degree of curricular attention that many of the conventional pedagogies of design place upon it.

One approach to this is to construct a curricular position in which both the methods of intervention and the context of application for a project are placed within an enlarged field of discourse that is activated by the inclusion of issues of topicality as an implication of and for practice, thematic and developmental scales, and sociality as dialectic for learning. This approach, entitled the Scale of Implication Model (SIM), provides the design educator with a comprehensive framework for structuring project moments through FAT project modes and through a concerted focus on the cultural-historical activities of learning to design by actively designing.
4.3.1 Case Study: Diabetes Studios

This process of framing a design studio through an enlarged narrative construction can be seen in engagements through design studios with a community of stakeholders in the realm of diabetes. The subject of successive RMIT design studios over a four-year period from 2006 to 2009, these studios worked across a set of themes: ‘rethinking care’, ‘the home’ and ‘the remote-transnational context’. These contextual themes, each rich with stakeholders whose various views needed to be included, for innovation in how individuals and communities might manage diabetes. As diabetes is a condition that is ‘lived with’, it is therefore a space in which the quality of life of people with diabetes and their careers can be socially, technically and institutionally mediated, and emerges for design intervention as a social and technical network. A primary characteristic of these studio projects was the requirement that students adopt a people-oriented design practice by placing the people with diabetes at the center of their projects, thereby pushing issues of manufacturing and medicine to the periphery of the design process. Through this approach, students were encouraged to fully explore possibilities for change – not by disregarding the range of expertise present in the complex area of diabetes, but by momentarily putting aside field knowledge that is assumed and accepted to look for innovation in alternatives. Repurposed as an agent of transformation and capability development across the social, technical and material segments of an intractable problem, these experiences sought to re-orient normative meanings and methods of design.

Central to the diabetes projects was the construction of a narrative of the complex diabetes situation. Seen as a system, this fictional construct operated as a device with a level of abstraction that allowed students, experts and
people with diabetes to engage collectively and contribute to the layering of the 'project diabetes' narrative through their own discourses and practices. In this instance this 'fiction' constituted the forum for testing 'design activism' as a particular mode of professional practice for industrial design. In this space, accepted understandings of the diabetes situation were disrupted by re-presenting the problem of managing the condition for people with diabetes and the broader diabetes community as one of flawed design mediated through an ad hoc system of things – a system in which the medicalisation of condition management has inadvertently produced a collective and distributed artificial pancreas, through the universalisation of blood glucose, insulin, dietary and exercise management regimes, and data sharing between people with diabetes, their carers and their doctors (Varadarajan, Fennessy et al. 2009). Like a real pancreas, the artificial pancreas, as this system was named, is a sensitive organ that demands fairly consistent inputs and outputs for it to function effectively. The problem lies in the fact that the artificial pancreas functions through the maintenance of practices and lines of communication (inputs and outputs) between people and is mediated by technological things. The protocols, governance and languages of the artificial pancreas tend to preference the role of experts, who can appraise and predict patterns from the complex data that the system generates, rather than the person with diabetes. As people and technologies are never truly consistent, when the system falters it sometimes has catastrophic outcomes. The problem is therefore a design problem, and the solution lies in the development of ways of increasing the tolerance range of the artificial pancreas.

The mapping out of this narrative and its elements constituted a key activity of the teaching so that students could reappraise understandings of the diabetes problem by layering micro, macro and meta narratives so as to see
patterns in the complexity of the situation. Mapping provided a first step in orienting design as a means of democratising or increasing the tolerance of the artificial pancreas. The process of mapping revealed the social, technical, institutional and economic discourses of diabetes, disease management and the medicalisation of health: where notions of the body, embodiment and the universalising of ‘condition’ as the binding mechanism for community are contested. Beyond this mapping, the design activity was one of proposing interventions into multiple sides of the condition so as to elicit a greater granulation of the social nature of the problem. However, the absence of a prototypical artifact that could be the subject of redesign, or a concrete and solvable need requiring a focus on design intervention, presented unique problems for students in the ways that they could navigate their learning.

In seeking to understand the situation of diabetes outside the conventional design for manufacturing context, the construction of scenarios and storytelling became the dominant artifact for a design project. The roles of the designer, researcher and educator as expert were muted to give adequate space for the individual voices and narratives of the diabetes community to be heard and incorporated into the thinking of the learner. Students were given a framework to theoretically locate individual projects within the overarching contextual themes: a series of dichotomous project typologies – for example, the short and long-term, the transverse and longitudinal, the new and the redesigned, and the product and the service. This framework helped to define the students’ work and position as designers within the complex space of diabetes, to mitigate the high levels of uncertainty many students experienced when developing their projects, and to counter much of the resistance that students had in designing differently from how they had previously. This resistance often acted as a conceptual trap for students. Some students latched
on to the ‘technical’ dimensions of the problem area and found it difficult to reconcile their roles outside of designing a technical solution. Others conflated the role of design intervention as having a communication imperative with notions of accountability — where the information that is communicated through technical devices must be ‘true’, leaving very little room for the half-truths, miscommunications and interpretations that are part of any community. Similarly, some students, in specifying a device or procedure by which complex data might be collected and managed, struggled to include incidents of misuse as legitimate actions of the community of users. Other students felt compelled to try to link all meaningful data in the reporting of the condition as inputs of equal value and found it difficult to rationalize the variety of positions and priorities that people with diabetes have. Finally, some students clung to frames of reference such as ‘efficiency’, as though it alone might yield appropriate design solutions.
4.3.2 Pathways for Enlargement

The Scale of Implication Model works on the interplay between a Social Focus domain and a Disciplinary Focus domain. These domains are each enlarged to deal with higher levels of complexity in interpreting and working with the implications of design activity. Pathways for enlargement are enabled by both Developmental and Thematic Scales that provide a location for narratives for both learning and for the application of design in relevant fields of theory (see Figure 4.2).
4.3.3 Social Focus

The Social Focus contains three scales: the individual (You), the community (Us), and the community and its others (Them & Us). These scales provide a structure into which scaffolded conversations can be located to accompany the technical, creative and methodological activities of a design studio project. The transition from individually inhabited and often prefigured meanings and values of disciplinary identity to a more coherent appreciation of ways in which industrial design functions as a professional community is made through the building of affiliation through peer-to-peer learning. This transition forms through the construction of conditions for communities of practice within a project by dividing and assigning specific roles for individuals working towards a common objective. Working in a team and individually delivering particular aspects of a collective design project, activates both a sense of disciplinary community and enables reflection on individual learning and capability development. The transition from a collectivized or community (Us) sense of disciplinary practice to deeper appreciations of the interactions and implications of professional activity on other fields of practice (Us and Them) and other discourses is enabled through two concurrent moves that each lead towards notions of critical practice. The first move is the drawing from the individual lives of learners as representative of experiences that fall outside of disciplinary concerns. Individuals perform as consumers and users, and discuss openly the implications of design decisions on the ways in which they function with things and systems in order to live and work. Often this discourse involves the inclusion of family and cultural experiences and interpretations of industrial design and its implications.
This move opens a dialectic between notions of the self and of others through an associative interchange. This interchange enables new forms of conscientization, in which the individual starts seeing their particular agency (as a combination of disciplinary capability and individually held or acquired value positions) in acting in the world. The second move concerns the association of meanings and motivations for design practice on broader social and cultural spheres as a collective and critical professional action. This move provides a space for the negotiation of ideals of practice: of what impacts industrial design as a profession ought make in the world. The conversations that emerge from this often see the profession and the implications of its cultural-historical actions problematized. In a similar manner as the first move, this activity enables a figuring of meanings of and for practice towards a more nuanced appreciation of the role of collective capacity on delivering shared ideals into the world through a concentration of particular discourses of practice. A problematisation of design discourses including sustainability, 4.3.3.1 Case Study: 
Diabetes Studios as Location for Activism

social design, inclusive design, design for health and design for development emerge through such conversations, and in doing so ascribe greater value to their core positions as activist and advocacy positions for industrial design. Many of the design studios developed and delivered at RMIT, particularly in the health and sustainability fields, can collectively be seen as a project of attempting to enable industrial design students to become design activists. This agenda for design education has been directed into numerous studios in the areas of health, sustainability, consumption and inclusion, and variously named 'community-engaged practice', 'campaign projects', and
‘concerns-based practice’. This inclusion of activism as a valuable disciplinary orientation has required the development of alternative ways of considering the discipline and its pedagogic conventions. Often in these projects design actions are situated far away in remote, rural and poor communities. Alternatively, the distance between the student and the context of the problem is not one of geography or socio-economic difference, but degrees of unfamiliarity with the particular conditions of a community. While demanding a redefinition of practice away from notions of design focused upon consumption, and located in the home, the shop, the things that people want, and the construction of material desires, these activism-oriented project experiences can be tremendously meaningful for some students. Working on projects that respond to a need, and might enable the activities of a designer and outcomes of design to make a difference to the lives of people presents a compelling narrative for an enlarged sense of doing design and being a designer.

The various RMIT Diabetes Studios involved projects including the design and testing of new products, new software systems, modification to existing products, propositions for new services, and strategies for the establishment of diabetes management service systems for Australian, Indian and Chinese contexts. Most projects provided an individual or a subset of the community with diabetes with an appropriate set of material and technological artifacts to manage their condition, and hence could save lives. Given the gravity of the implications and potentially positive impacts of design in the diabetes space, such projects come to represent a powerful and transformative influence for students. It is an influence that binds disciplinary and civic learning and provides new ways for students to encounter notions of ‘the other’ through their formative training. From such experiences the process of learning design becomes, for the student, a mode of activism, a situated and critically engaged
practice, and ultimately forms as a strategy for social reform through design that sits with other notions of professional practice. In this mode of activism through design projects, ‘the other’ is encountered not simply as a placeholder for difference – where one side looks upon another – but, in a Latourian way, as sets of socio-technical-contextual-institutional-experiential actants that determine the ‘othering’ of the student from the issue under enquiry (Latour, 2005). The orienting of the learner and the institution of learning as the ‘other’ in the situation draws on traditions of emancipatory pedagogy (Freire 1995) to privilege the people implicated in the enquiry – the student, the community, the teacher, the producer and so on – and attempts to normalise the role of the designer as a negotiator of discourses and as an agent of social reform.
4.3.4 Developmental Scale

The Social Focus domain is bridged to the Disciplinary Focus domain through a concentric Developmental Scale. This scale provides a means of seeing the developmental capacity desirable or required for deep learning between the individual foci of each domain. The Developmental Scale shows a phase change from individual capability development to collective capacity development and finally to conscientization. Individual capability concerns the foundational knowledge and skills required to undertake a design project. This includes fundamental communication skills, technical knowledge and an appreciation, even if only abstract, of how and why industrial design practice functions within different contexts of application.

Collective Capacity concerns the combined ability of designers working as a community, or more broadly as a profession, toward shared agendas and through shared value frameworks to effect change. This demands knowledge of how designers interact within different systems of value and use, and importantly how different discourses for practice are formed and progressed through shared agendas.

Conscientization denotes the point at which the individual, through a reflexive sense of their own practices in relation to collective capacity, forms a critical consciousness (Freire. 2005). Building on Freirian concepts, this point on the developmental scale is declarative, in that it is where an individual or a community of designers as learners can articulate the particular ideological thrust of their approach(es) to practice and how it might respond to other values present in an enlarged appreciation of their prospective contexts of practice.
The aim of social reform as a shared ideological agenda, mediated through the engagement of people in the processes and artifacts of design (products and services), while marginal, has been a tacit driver of activity in industrial design education since the discipline’s inception, implicit in the ways in which ideas are encountered in the world and evaluated between teacher and student. However, when social reform is positioned as an explicit curricular aim, these tacit ways of valuing the transformative possibilities of design are in and of themselves inadequate in the development of the designer, and therefore the effect of the outcomes of design on people and communities. Social reform agendas instead need to be interlinked to normative notions of practice and conveyed as set of ideals by which method and approach are contextualised and are to be validated.
4.3.5 Disciplinary Focus

The Disciplinary Focus domain contains three levels of socio-technical complexity for industrial design. This use of a scale of complexity, however, does not assert that any individual disciplinary foci are necessarily of any greater or lesser complexity for learning that the others, simply that each deals with the designed thing and its systems from different practical and theoretical precepts. While each focus is contingent on the other, the particular division of ‘the thing’, ‘the system of things’ and the ‘implication of the thing/system’ provides discrete locations for different types of project construction and the generation of different types of design learning outcomes.

The first foci is ‘the thing’, which provides a location for projects that deal with the technical, aesthetic and user details of designing a particular product or service. Projects located in the second foci, ‘the system of things’, typically interrogate the interrelations of material and technological artifacts within systems of utility, value and meaning. Design discourses including interaction design, service design, transportation design and indeed any sub-field of industrial design practice if approached from systems and material semiotics perspectives. The third foci is concerned with the ‘implications of the thing/system’. Implications-oriented projects look at both the issues of designed things and systems on other things and systems through discourses of innovation, business, sustainability and social, technological and economic change. Projects structured around these discourses often demand the inclusion of critical theory and design thinking as a means by which the causality of implications through design can be identified, and alternatives can be proposed or speculated upon.
4.3.6 Thematic Scale

Sitting alongside and crossing into the Disciplinary and Social Focus domains of the SIM is a Thematic Scale. It has three reference markers – the micro, the macro and the meta – into which a narrative to frame a project can be attached. These are used as an organizing device for projects to be oriented and reoriented relative to the three tangential domains of development in the SIM tool: the Developmental Scale, the Social Focus and Disciplinary Focus. The boundaries and linkages between these various points in the model are open for interpretation by the educator and relative to the particular content focus or subject matter of a project. Learners move between various points in order to generate new and deeper meanings of their ideas in the context of the implication-oriented project in which they are engaged.

4.3.6.1 Micro Level

The micro level is concerned with the detail of design activity. Projects constructed in this level would typically attempt to enable capabilities in the application of design techniques through a narrow but deep investigation into the specificities of a particular design problem, need or opportunity. In this way the micro scale concerns the individual learner and their particular developmental needs in relation to the implication under enquiry. Negotiations between the educator and the learner here are framed around enabling and enacting specific capabilities for designing and for the orientations to design that the learner might take.

4.3.6.2 Macro Level

The macro level is concerned with how a designed thing, service or system operates within particular discourses and communities of industrial design.
The macro level is where most design studio projects and their framing narratives are located. Projects constructed around macro narratives are concerned with the methodological domains of industrial design and how theory for design might direct or inform particular orientations to practice. This negotiation exposes the learner to the economics and systemic concerns of industrial design as a project of industrialization, and a determinant of people’s practices within society. The individual students undertaking the project form as a particular community with a particular set of needs through a process in which they reconcile their individual capabilities relative to the capabilities of others. Conversations here are often about how the students might collectively understand or appreciate an issue or problem, how they might work together as a team, or how they might contribute to collective development through peer processes. Macro-level projects often deal with questions and issues of the general capacity of the discipline to invoke change and to bring new value into the world through its methods and outputs of practice. Here there is a negotiation of how the specific activities of the learner and their peers might map across to the various modes of industrial design practice. Such a mapping might be quite clear, but if the project deals with issues or methods that sit on the boundaries of normative modes of practice it might be quite challenging. This orients students toward a critical appraisal of the discipline’s current and past capacity to deal with the kinds of issues or concerns that their project requires them to address. This does a series of things for the learner. The first is that it serves as a kind of benchmarking of best practice that the learner can discover and then emulate. The second is that it often – and especially in projects concerned with issues of sustainability – allows students to see that they have capacities that might redefine the value positions and design processes of professional practice. Finally, such a benchmarking allows students to find gaps in current disciplinary thinking and actions in order to direct and locate their project work.

Industrial design education has traditionally restrained itself to questions
of how design might contribute to the enterprise of manufacturing products, and has kept out of expert discourses such as those prevalent in the ‘socio-technical-contextual-institutional-experiential’ domain of diabetes and its numerous medical and social dichotomies. However, the portrayal of diabetes as a condition that generates specific management needs creates a place for design – a place for implementing alternative methods of ordering and interpreting specific issues in contextually appropriate ways. The transformation of the disease from being framed by a specialised clinical language into an experiential phenomenon offers design an opportunity to visualise, reconstruct and recast difficult situations into products and services that are more attuned to actual needs and that can make everyday living more manageable for people with diabetes. In this way, design is positioned as a marginal or peripheral discourse in diabetes that is non-threatening yet at the same time acquires its own agency. This reorientation of design as an agent for constructive intervention is distinct from mainstream design education practice in that the social and political are elevated over notions of manufacture and market and privilege the marginal discourses of a problem as locations for innovation.
4.3.6.3 Meta Level

The meta level provides a location for narrative construction around big ideas, wicked or intractable problems, and what it might mean for both the discipline and the individual to confront the boundaries and limitations of their practice within such complexity. Micro and macro-level negotiations are taken into a broadened social discourse in order to establish conditions for conscientization. It is within this level that learners begin to figure and infer their particular disciplinary approaches and the outputs of their projects against what these actions might mean in the world. At this level the conversation draws learners back from their specific disciplinary development and reorients it through the negotiation of theory and ideas that sit outside of or tangential to design practice. This is important as it is where ideas and ideals are challenged and critiqued in view of a reflexive return to the micro and macro: where the learner starts to see herself seeing the world. The meta level focuses the activities of practice into a discursive space where the implications of designing are able to be reflected upon.
4.3.7 A Tool to Think Through

A generalizable approach developed through reflection and refined through the construction of multiple implication-oriented projects, the SIM operates as a dynamic model for both the planning of design projects and learning activities for the educator. For students, it offers a way to locate and relate the various moments of their individual and collective design enquiries when working in areas or problems that have no predefined design outcome. In practice, the model is used as a tool to think through, map and determine design and research activities and the relationships between the particular topics of investigation. Its use as a tool is not intended to script a path forward for either curriculum or project design in a precise manner, but serves as a way for educators and learners to reflect on ‘moves’ that might be taken.

While deliberately expansive, this model is, however, not unidirectional. Implicit in it is a temporal factor in which negotiations of the previous levels are carried through as the learner shifts their activities into either ever-larger or more focused remits of consideration. This ‘carrying through’ is activated by the teacher, the project content, and by the engagements that an individual learner has with their peers. It requires a continual reiteration and re-articulation of the work done and ‘scales’ encountered so as to redefine learning in one sub-domain within the kinds of questions that emerge within the adjacent sub-domain.

These levels of negotiation form one way of structuring projects for design learning that is conscious of the sociality of both education and design practice. Implementing such a model requires the educator to contend with broadened understandings of disciplinary practice and is only suitable to specific kinds of projects, in which the learner is allowed to pursue a line
of inquiry that is left unbounded by the curriculum. What is critical for the educator in using such an approach is their ability to move with students as individuals and as a collective through the various scales fluidly and in a way that does not overwhelm the learner and trap their thinking within any one of the three scales. This is easier said than done, as within any group there will be learners with differing abilities and differing levels of preparedness to move through a learning process that privileges divergent and expansive thinking. For the educator to modify approaches to suit the particular learning needs of a cohort, it is useful to have a more temporally defined model by which the general hierarchies of development described in the SIM can be isolated from the ways in which a learner transitions through a design project.
For the actual transition of a learner through a design project, particularly one that is attempting to take students beyond prefigured meanings and assumed roles and expectations, it is important that the learner sees the process she is going through. Theories of meta-learning provide a significantly abstracted and generalizable way to understand such a process but often do not provide a clearly deployable model. A project narrative that defines the subject, the thematic field and the topicality of a project presents the learner with a vast, even overwhelming scope of possibilities for design activity. Prefigured meanings and approaches to doing design can dominate a learner’s disposition to practice. This can be imagined as a kind of knot where the learner’s capacity to ‘un-tie’ expectations of design from outside of the doing of design is limited. The moment of entering into a project for the learner can be conveyed as being at one end of a cord or a tube that she then moves along or through. The learner moves along the cord (for sake of analogous simplicity) and carries individual notions of the self and of the meanings and values of prior artifact experiences – both material and immaterial.

4.4 Knot Theory

For the actual transition of a learner through a design project, particularly one that is attempting to take students beyond prefigured meanings and assumed roles and expectations, it is important that the learner sees the process she is going through. Theories of meta-learning provide a significantly abstracted and generalizable way to understand such a process but often do not provide a clearly deployable model. A project narrative that defines the subject, the thematic field and the topicality of a project presents the learner with a vast, even overwhelming scope of possibilities for design activity. Prefigured meanings and approaches to doing design can dominate a learner’s disposition to practice. This can be imagined as a kind of knot where the learner’s capacity to ‘un-tie’ expectations of design from outside of the doing of design is limited. The moment of entering into a project for the learner can be conveyed as being at one end of a cord or a tube that she then moves along or through. The learner moves along the cord (for sake of analogous simplicity) and carries individual notions of the self and of the meanings and values of prior artifact experiences – both material and immaterial.
On commencement of a project this cord is often tied in a tight knot for individual learners. This image of a knot splits the cord into five segments as represented in figures 4.3 and 4.3.1. Starting on the left the first segment denotes assumed meanings and is used as a site for unpacking tacit or socially constructed understandings of a particular problem, scenario, system or thing. In practice it uses the prompt ‘as it appears’ to aid learners to see their initial concepts of a subject of design as only a segment of an as yet unformed whole. The next cord segment is a site for a more objective analysis of the subject through defined methods and uses the prompt ‘as it is’ to lead learners toward a more defined and robust concept of a situation gained through various forms of research. The third functions as the space for speculative and creative
thinking, where a subject is re-imagined through design processes. The prompt ‘as it might be’ is used as a way of opening up possibilities for alternative responses to a subject of design investigation. The fourth segment provides a space for ideological re-framings and propositions for how, what and why a subject under design should be a particular way. This segment is declarative and uses the prompt ‘as it ought be’ as a means of focusing the learner’s response through various means of critique and project defence. The fifth and final segment is concerned with the meanings that are made through the process of actualizing or realizing a design response to a particular subject. The prompt ‘as it becomes’ draws attention to the role of actualization in industrial design and the need to inscribe learning from this segment into a broader sense of individual capability and collective capacity development.
This cord is tied through itself twice, leaving five segments that each constitute a sequence of activities in meaning making for design learning. The role of the educator is to assist the learner to loosen the knot to reveal space between each segment for learning and is represented as a transition from figure 4.3 to figure 4.3.1. Once loosened, the interactions of segments in the knot can be used to both describe and discuss with learners project activities in relation to processes of learning how to learn, and as a means for the educator to structure appropriate project phases and stages.

The knot model has two key structural changes that emerge once the knot is loosened. The first is cord segment equalization, which exposes the totality of a project and its stages in ways allowing the particular methodological needs of a design project to be located. The second is the use of the opening up of apertures between cord segments and the slippage of the cord as it crosses itself as locations for reflection in action. These apertures and crossings provide a set of key moments to initiate specific types of reflection to enable deeper levels of learning.
4.4.1 Cord Segment Equalization

Loosening the knot (see Figure 4.3.1) shifts the diagrammatic model so that the total space on the cord previously dominated by disposition towards assumed meanings is dramatically shortened and the length of each of the five cord segments is roughly equalized. The equalization of cord segment lengths provides learners with a greater sense of the totality of a design project and the negotiation of elements in order to generate design outcomes and to fully comprehend individual learning development through the project. This process can be used as a way of seeing the limits to their own presumed understandings of the capacities required in the learning project, through an overlay of the transition from working from a priori positions; the construction and iterative reconstruction of disciplinary meanings; and, finally to the realization of designed responses (Figure 4.4).
4.4.1.1 Case Study: Diabetes Projects

This transition through assumed meanings of practice to new and enacted meanings happens in most implication oriented design projects. Within the Diabetes Studios this transition took a particular route. Critical to the staging, or loosening of the knot, was a highlighting of the ways in which design problems, such as the problem of diabetes or notions of ‘care’, are normally tacitly constructed and design activity is enacted in response to a brief from others. As a design process that did not have the conventional path of responding to a brief, the Diabetes Studios required the entirety of the situation to be problematized and redefined from the perspective of the designer as a co-creator of social practices. As such, students were compelled to set aside presumptions of how a situation might be approached and were asked to individually situate themselves as someone who has a very real stake in the situation becoming something different from what it is, by asking ‘how ought it be?’, thereby rendering the learner and their work as legitimate stakeholders in the situation.

In this particular studio construction listening to the voices and the narratives of people was crucial for students to meaningfully engage with the authentic problems of others and to innovate in ways that were unconstrained by expertise. Without the distance provided by the usual abstraction of design problems by conventions of production, market and client, the capacity of students to bring their own initiative to their learning was supported through particular approaches to teaching and a restructuring of ideas of the discipline as being (and needing to be) far more porous in concept than previously assumed. Working so closely with the lived narratives of communities presented challenges for students and teachers alike, as understandings and
expectations of legitimate learning outcomes in the context of industrial design education need to be frequently reconsidered.

Students found that learning through the narratives of people with diabetes was accompanied by an awkward negotiation of their roles as designers and learners. Reactions to the open-endedness of the approach included building a strong sense of purpose to the problem at hand or reconstructing their individual identities as marginal, but legitimate, voices within the context of the problem. In both orientations students demonstrated a responsibility and care in their work with communities, and by drawing on individual experiences they told stories, built working relationships with stakeholders and used whatever agency they had to honestly respond to the situation. These relationships were in the first instance facilitated by the educator, but once established students developed an autonomy and ownership of the relationship and its maintenance through design actions. This immersion into a community facilitated the development of greater levels of empathy, and importantly a realisation that designers are not always able to provide functional solutions to complex scenarios. However, even if in enacting a project students did not feel that they had articulated a truly responsive ‘solution’, then the lack of solution was still respected by the community as a valuable contribution to it and its particular negotiations.
In illustrating this aspect of the model it is useful to frame its stages and their overlaps through common descriptors of design project activity categories. In doing so, the diagrammatic tool serves as a kind of map for learners to apprehend where they currently are in a project and where they will move next (see Figure 4.5).

A typical industrial design studio project has eight main stages of activity. The first is when learners are introduced to the subject and theme of a project through a briefing. This is a combination of the provision of resources to undertake the project and the clarification of key objectives of the project, both in terms of design activity and outcomes and developmental outcomes.
and intentions. The second stage is when learners functioning as designers construct a hunch as to what the design response might ideally be. This forms as a prototypical solution or goal image that is then carried through the project as a point of reference. In problem-solving-oriented design activities, educators tend to encourage students to resist this formation in order to delay the premature materialization of a solution that is not fully tested through research. Yet these individually defined hunches or goal images are ever-present, and if understood and explored with learners can be very useful for progressing through a project. The third stage is the research stage. Research methods are typically a combination of design thinking, examining relevant precedents, technology-oriented research and gathering user and contextual data through various ethno-methodological processes. In the fourth concept development stage, learners begin the process of responding to findings from research stages and figuring them against both their current and aspirational capabilities to realize the project and the prototypical solution formed in stage two. Once developed, through combinations of design sketching and modelling, these concepts are refined through various processes of review and converge in stage five into a singular design proposition. These propositions are further refined and the detail required in order to realize them is produced in stage six. From here students move into stage seven to develop robust plans for materialization, and undertake activities including the development of prototypes and technical drawings. The final stage sees the learner present their response to the project through a combination of oral defence, testable prototypes, visualizations and textual reports that provide a rationale as to why their response is what it is.
4.4.2.1 Case Study: Diabetes Projects

As live design projects, the research domains within the Diabetes Studios relied on various methods to commence participatory processes. The use of different types of stakeholder meetings, group activities, and information-gathering techniques served as tools for mapping the totality of the situation (Kirdar and Silk 1995) (Weil and Reisch 2005) to inform design decisions. This approach used the research stages of a project as a generative mechanism that aimed to amplify the disregarded and faint voices of people with diabetes and to make those voices explicit through tested design propositions as projects progressed. The role of the design educator within this space focused on enabling the development of agile problem setting and solving, empathy, and the ability to listen deeply to the situation as a set of particular capabilities through research and design. In turn this approach, in which the context of the problem sets out the parameters by which the designer can contribute, saw learners adopt a more flexible identity as a designer and increased capacities to manage the ambiguity of complex design activities than they had on commencement of the Diabetes studios.
4.4.3 Reflective Apertures and the Provision of Slippage

The points at which each cord segment crosses or slips past another and the apertures between the cord segments represent particular moments for reflection in action within the knot model. Design projects are never truly undertaken by students without the very early construction of a goal image as to how the project will unfold and what the outcomes might be. As such, learners in design projects are always pre-synthesizing solutions and responses as means of steering the project towards particular ends. Rather than dissuading learners from this, it is useful to leverage their inherent predisposition to project a prototypical solution by making it visible in the process and converting these apertures and crossings into moments when particular forms of productive reflection in action, using projected and prototypical solutions as a reference for actual progress and development, can be done.

Apertures represent moments for collective reflection and discussion between learners. These moments typically accompany design development activities and operate as informal or peer-to-peer negotiations of what has been done and what that means in view of what is to be done to move through the project. As the Knot Model offers learners a conceptual map for learning, these aperture conversations serve as a means by which learners can project their actions forward as a tool for the clarification of future steps.

Where the cord crosses itself to form the knot, one can see four moments of slippage between what an individual learner is actually doing and what they thought that they might have been doing as they project their way through a project. These crossings represent points (Figure 4.6) at which purposeful individual reflection can be initiated so that a learner can consider their
current activities in light of previously formed and projected notions and actual experience. This provides a degree of flexibility for the learner so that they can (if needed) return to various stages to undertake further work, or to correct assumptions.

The first moment of reflective slippage (A in Figure 4.6) is where knowledge gathered through objective analysis of the problem or situation under design is tested against changing notions of what the design response might be and should be. The second (B) is where initially conceived hunches are actively considered against more fully formed design concept propositions and the implications of these propositions in relation to both the gathering notions of preferred solutions and the eventual realization of the project and its outcomes. The third (C) is where new ideological positions about what the response or design solution should be, and how it ought to impact the problem or situation under design, are tested against initial prototypical hunches in
order to reflect on the particular discoveries and gaps in understandings that have emerged through the research stages of the project. The final moment (D) is where the realized design response, and the various compromises encountered in the process of actualizing the project are considered against findings from research stages and conceptual propositions developed earlier.
When deployed as a multilayered strategy for teaching and learning, the knot model (Figure 4.7) operates for the design educator as both a means of revealing the full situation of a project and for the planning of particular project activities. The points at which the cord crosses itself can function as opportunities for intermediate critique. Similarly, the work done in each segment and the reflection on that work in the aperture stages can be isolates as discrete packages of work for the purposes of progressive assessment. Students can use the knot model as a way to manage their learning and the various milestones that they might encounter and to remind themselves of the role and value of reflection in action as it relates to the development of robust design responses. This is particularly important, as for learners it is often difficult to see the implications of particular design decisions on the sum of a project while in the midst of it. Staging reflective activity around the inter-contingencies of specific project activities provides a clearer framework for learners to purposefully reflect.
Outside of the design studio, the educator is less able to readily define project narratives and the sequencing of project activities. The final-year self-directed research projects common in industrial design constitute such a site, where the prominence of the pedagogue as constructor of particular meanings of and for practice recedes. For students, previously encountered narratives for industrial design practice through design studios and other courses become pressures or justificatory positions for the generation of or association to locally applied modes of design action that lead out of education and into professional practice. In such a pedagogic scenario, implications of design as collectivized negotiations get redrawn within the nature of an individual’s construction of meanings for practice, and get pushed towards what might be locally permissible and accepted from outside of education.

Porosity to the local is a characteristic of most, if not all, industrial design programs and is particularly visible in the ways the final project in design school is constructed. Conducted over either a six-month or one-year period, final-year undergraduate industrial design projects usually take one of two forms: a live or industry-linked project in which the student is located in the university and working alone or in a small group under close supervision from a tutor/teacher, or as a research-led and significantly autonomous project. In some universities it is common for students doing industry-linked projects to be situated inside the research and development (R&D) labs of large companies or working inside design consulting studios. This model is popular in active manufacturing contexts and where dominant notions of what design means are defined by design jobs inside manufacturing enterprises. Project
constructions in this vein can be construed as ‘professionalized’ modes and indicate an alignment of design theory, and particularly methods of design management, to concepts of practice that locate the designer within the expertise network of the producer. The research project model works from a different precept and sees the student demonstrate the ability to research a topic or subject, often of their own devising, to produce a thesis that sits alongside and explicates prototyped and tested material design outcomes. While common in traditional universities, this model is also to be found in newer incarnations of industrial design programs in universities where design is located within departments of engineering and computer science, and where industrial design is oriented towards new product, process and service innovation. The final-year design project culminates in the delivery of outcomes that collectively demonstrate the values of the inquiry and signal a readiness for professional practice. Both forms of final-year project typically end with an examination by a ‘jury’ to which the student orally presents and ‘defends’ their work through a justificatory narrative that positions the project as responsive to the external inputs that have been discovered through engagements with experts, or through findings from qualitative and design research methods.

Towards the end of the third year of the four-year undergraduate industrial design program at RMIT University, students typically submit a proposal for a project that they would like to undertake in their final year and select an academic supervisor who they feel might best support their particular project motivations and methods. The range of topics that students propose to enquire into is vast, ranging from technical product design and interaction design to contemporary craft, to experience and critical design, automotive design, and to design for sustainability. Drawing on prior experiences from design studios,
the final-year project is undertaken as a demonstration of their capability to set up and execute a complex and theoretically rich design project. Once students commence their final-year project, clusters of commonly inclined students are formed into a small colloquium-type studio setting usually with a single supervisor; each student has their own independent inquiry but they share an ideological or theoretical motivation. Often defined to particular sub-fields of industrial design, these colloquia are micro-studio-type engagements and can be seen as an alternative territory for design education to the studio, as the methods deployed in each constitute specific forms of situated design research practice. Unlike the design studio, where the educator defines the project narrative, the role of the supervisor in this context is primarily one of mentorship to facilitate the construction of an individual’s design practice and narrative account of his or her project.

Just as curricula in industrial design in Europe and North America have specialized to deal with their own local design cultures, Australian-trained industrial designers have become renowned for their ability to take projects through to prototyping and manufacture. This skill in fabrication, detailing and manufacturing thinking is an ability that is taken for granted with students in the fourth year of the RMIT undergraduate program, where there is a collectively assumed and expected rigour in the ways a student approaches the actualization of an industrial design project. Projects almost always result in fully functional and manufacturing- or deployment-ready product/service design outcomes. This aspect presents the supervisor with an additional layer of capability transfer to perform, in which both the technical translation of design research propositions into production and the role that such propositions might play as new enterprise formations to make change are supported.
The institutional circumstance of the industrial design program at RMIT University affords the adopting of perspectives on design from disciplines of architecture, interior design and landscape architecture. This proximity to architectural discourse has meant a distancing from some core ‘industry’ and technical design for mass manufacturing orientations that might otherwise dominate an industrial design curriculum located alongside fields of engineering. At the superficial level it has meant that certain aspects of industrial design, such as interior spaces and objects of relatively low technical or user complexity but high aesthetic value, such as furniture and tableware, have become more prominent in the students’ disciplinary gaze. However, at a deeper level the crossing of disciplinary discourses of design have actively raised tensions between how practice might be best positioned: as either propositional or justificatory. In the construction of final-year projects, this tension manifests when a traditional notion of industrial design as tasked with the goal of making materially mediated tasks easier, or increasing the uptake of technology, is made subservient to a view of design that is on one side unapologetic about making artifacts that can be appreciated solely for their visual qualities, and on the other privileges attempts to design solutions to complex problems. For projects, and supervisors that function in the space of the latter, and that actively attempt to problematize meanings of industrial design in view of an implication or concerns-oriented approach to practice, such a contextual situation demands particular performances. The role of the educator or supervisor in this context is twofold: they must represent particular methodological and ideological discourses of industrial design, and support or challenge the implications and practice narratives of their students. These roles and how students position themselves are examined in the following section through a discussion of the final-year project in the domain of social and sustainable design.
4.5.1 Social and Sustainable Design as a Complex Narrative for Practice

Over the past two decades industrial design researchers have actively engaged with sustainability and socio-material studies as an agenda for and subject of design interventions. The challenge of bringing change to the environmental implications of entrenched social and technical practices that are mediated through designed things sits in a field of practice that has been rather loosely titled (for the purposes of supervision) Social and Sustainable Design at RMIT. Final-year projects in this field generally focus upon design as either a socially engaged and negotiated creative practice enacted through sustainable design and service design frameworks, or as a significantly technical enquiry that attempts to make an impact on environmental or social concerns through product design activities. Undertaken through a set of defined methods to develop and think through design problems and their solutions, projects in this domain are very often oriented as speculative and propositional visions for alternative socio-material practices mediated through new forms of products and services.

Figure 4.8. Sketch Schema of Life Cycle Flows.
Within final-year projects, the ideological agendas of sustainability thinking are in many ways made hostage to the anxieties of viable career pathways and negotiations of how industrial design might be redirected towards less un-sustainable ends. Sustainability in Industrial design at RMIT University has deep roots in the eco-redesign movement, which holds a belief that incremental change to products is the primary contribution that design can make to deliver reduced environmental impacts as illustrated in figure 4.8. However, the gradual decline of volumetric local manufacturing and the integration of eco-design into the remit of product and manufacturing engineering over the years has meant that eco-redesign has become a largely hypothetical prospect for industrial design and used as one aspect within a broader Life Cycle Thinking approach. As the global debate around sustainability and social design has evolved, discourse and method in fields of design for sustainability have similarly changed and sustainability has migrated from being a technical concern to being more closely defined as a social discourse for the transformation of daily practices. In this way sustainability frequently intersects with other fields of design enquiry and changing notions of the economics of material things as ‘owned’ towards sharing, repairing and re-distributing via service systems models that empower individuals to implement behaviour change in their practices. Critical to enabling behaviour change through design is the belief that, if given appropriate tools, products, services and strategies, people will transform the ways they do things in a more sustainable way. Through these shifts, industrial design practice has enlarged its pro-sustainability scope from questions of redundancy and efficiency to questions of redirected practice and new enterprise design, and more recently to questions of radical conservation and the use of design to intervene in public health epidemics such as obesity.
These concerns, when located inside a practice that has such inherent power to proliferate the unsustainable through the production of desire as a strategy for often-needless consumption, elevates all sorts of disciplinary anxieties.

These anxieties of practice produce uneasy projects, where the supervisor is often assisting the learner to see their individual approaches as useful elements of a broader movement for change. While often tense, the amplification of either an environmental or social dimension in a project leads towards the realization of outcomes that fall into various categories, including PSS design; eco-design as a central method in new product development; ruminative investigations into the nature of particular product or technologically mediated practices; social innovations and enterprises; and the design of strategies and services to tackle the social and environmental dimensions of cultural, technological and economic shifts. Through these projects the educator works with students towards cooperatively developing their visions of a better, and often significantly dematerialized world where the temptation for industrial design to play into the proliferation of the extraneous, luxury or vapid is actively problematized. Students often set up online social media groups and draw on each other to solve problems or get help with decisions and uncertainties that emerge through their individual enquiries, enabling students to undertake projects more efficiently and with greater vigour. By definition, the clustering of students around a field of social and sustainable design aims to support students with an interest in sustainability and the role of design practice within an enlarged discourse of global citizenry.

While each student is deeply involved in his or her project, the supervisory relationship is often focused on how and why the student is ‘playing’ the project in the particular ways that they are. This type of supervisory engagement is fundamentally concerned with creating a scaffold for independent learning and for nurturing a sense of confidence in the student
to keep her progressing design in unique directions. Students bring enormous amounts of energy to their projects, viewing them as individually ascribed prospects for defining and commencing professional practice. The liminality of the situation, as a transitional space between being a student and being a creative practitioner or professional, often drives this energy as it offers a unique opportunity to do a project that is potentially risky and a vehicle for idealism. The final-year project thus functions as a mechanism for individual ambitions to transform into practice, and to redefine design by doing what is worthwhile doing, and on what might make impacts on an area of concern.

While considered an individual enterprise, the final-year project can be seen as both a vehicle for the development of a unique venture based upon a design of a product or service, and as a component of larger discourses for disciplinary change and focus. In this way the final-year industrial design projects in Social and Sustainable Design at RMIT University form through two methodological pathways. The first can be broadly described as innovation-oriented and robustly demonstrated projects that seek to lead understandings and expectations of industrial design in the sustainability field into new areas, and in the second the entrepreneurial motivations of individual students are given form as enterprises that contain designed products or services as their currency.

Pedagogies that provide such a scaffold for disciplinary change require the construction of complex narratives and rationales for the need for change. Additionally they need particular approaches, such as those described through the models discussed in this chapter, to maintain the productive problematization of given meanings of disciplinary practice. Teaching to the implication in industrial design can be seen as a particular form of critical pedagogy in which notions of agency through disciplinary practice are activated towards the realization of ideals and preferred futures.
5. Looking for Ruptures and Inviting Change: Levers for Pedagogic Transformation

The future can only be anticipated in the form of an absolute danger. It is that which breaks, absolutely with constituted normality, and can only be proclaimed, presented as a sort of monstrosity. For that future world and for that with in it, which will have put into question the values of sign, word and writing, for that which guides our future anterior....

Derrida, in Reinertsen, Of Grammatology, (07:i)

To this day much of the industrial design education offered around the world has not adequately questioned the social and contextual drivers of the discipline’s early craft and industrial art constructs and their applicability in changing times and for uncertain futures. Design activity deployed as a problem-finding and solution-providing discourse within complex contexts of need, or in remedying the failure of prior design actions, requires the designer to function with prescience outside of normative producer-centric and aesthetic-driven modes of practice. Where design education attempts to frontally deal with altered contexts of practice or intractable problem areas, conventional methods drawn from pedagogic framings that emanate from other times with other concerns cannot provide the necessary scaffolding to ignite the types of agency that could enable the designer to think and act ahead of change. Making impacts, small or large, in such altered contexts or on uncertain territories of future practice require the designer to function as a particular kind of activist — where action toward real change is enacted through design, and where the agenda that underpins action constitutes the project. While degrees of change are always confronted by design, periodically the
pressures for change from externalities and from internal ruptures of discourse demand a recasting of the discipline, its methods and therefore its pedagogies.

Industrial design in Australia, and indeed in many similarly advanced economies, is presently going through such a radical recasting driven on two main fronts: the drift away from mass manufacturing as a dominant locale of practice and therefore disciplinary meaning, and the elevation of social and sustainability discourses as powerful moral and technical dimensions of practice. Relationships to serial and mass manufacturing, as a grounding discourse to professional practice, are undergoing a dramatic transformation in the local context. The impact of decades of incremental macro-economic and industrial reforms have been amplified by the effects of globalization, leading to a removal of the factory as a meaningful locale of practice for design and significantly shifted activity towards the service economy. For industrial design education in Australia, the prospect that the relevance of long-held and implicit notions of mass manufacturing as a curricular mainstay is thus challenged by a complicated mix of a rapidly deindustrialising local economy and interactions with the hyper-industrialising of neighbouring Asian economies. Increasing pressures, from within and from outside design discourse for design practice to confront the unsustainability of entrenched notions of design as an activator of particular forms of consumption through the generation of material and technological need, have gathered momentum over the past 30 years. Adopting such an orientation to practice turns the designer away from producer-centric modes of thinking and towards an advocacy of the social and the sustainable as idealistic locations for a critical practice of industrial design. The inevitable changes that emerge from such conditions complicate and destabilize the contemporary Australian design condition and how it might be pedagogically approached. Combined, these changes produce a new
form of hyper-localised practice that sees a letting go of mass manufacturing, particularly where it provides limited social or sustainability benefit, as a location for meaning and instead directs its practices toward the bespoke, the crafted, the dematerialised and the immaterial and new forms of design-led local enterprise, often independent of the manufacturing or mass distribution client as the instigator of design activity.

The case studies put forward in this chapter centre on the apprehension of these changing notions of industrial design and the role of ideals within practice as levers for disciplinary and pedagogic transformation. However, framing education around the reconsidering of a discipline in order to fit and formalize new paradigms of practice that are so significantly altered requires a relearning and potential discarding of disciplinary idioms and expectations. However, ruptured notions of practice present design educators with risks. On one hand is the risk of error in which the prospect of change is dealt with in uncritical or misdirected ways, and on the other hand is the risk of denial, in which a reliance on normative ways may not prepare learners for future practice. Teaching into ruptured notions of practice does, however, provide an opening for the development of new types of designers who can plan and evaluate new courses of action towards changed imperatives and a criticality in and of practice.
5.1 Issues of Validity in Reflective Practice

Pedagogic and design enquiry that explore how notions change through practice constitute particular forms of reflective action research. Reflective practice and action research require a sustained problematizing, abstraction and theorizing of enacted practice as a way of gaining deeper insights into tacit ideas and ideals. Reflection in action within the space of design teaching can thus be seen as a type of self-reflexive fieldwork, in which the disciplinary identity of the teacher and the changing context of disciplinary engagement are rendered subjects for research. While drawing on the underlying mechanics of reflection in action, such as the action reflection spiral, the method employed in the case studies in this and in previous chapters differs from Schöbian models of the reflective practitioner (Schön, 1984) that have been so influential in professional studies in the architectural and design disciplines for the past 30 years. Its difference is in the process in which presumptions of the disciplinary condition, and therefore the knowledge, practices and positions that make it, prior to reflection are floated – positioned as neither static nor known, or necessarily informed by a bounded body or canon of knowledge. Industrial design in the current condition is now radically different from what it has been, in that the methods of doing design have been fundamentally changed by new technologies and new locales of practice, and that the implications of designed things are now much more readily visible to the designer than they ever have been. In such a circumstance, presuming that the systematic design science approaches of the mid-20th century, in which the industrial designer operates as a part-player alongside other specialists in a mass manufacturing construct, or the intuitive and artisanal approach of design of the 19th and early 20th centuries necessarily provide the right mix of
Capabilities to deal with changing meanings of practice is unwise. Approached from a pedagogic orientation that privileges and indeed actively courts disciplinary transformation, this frontal recognition of the unfixed nature of disciplinary ideals in industrial design, in which issues of sustainability or social reform, or how design as a control and compliance discourse might be reconfigured, emerge and are activated through reflection in action.

Rather than being overtly auto-ethnographic in the method of narrative construction, this reflective work is abstracted against literature in the fields of pedagogy and design research and practice. It approaches issues of disciplinary transformation through education as a necessarily politically oriented process that seeks to articulate new ideals into practice and new practices into the ideological framings of disciplinary action and meaning. As neither design nor pedagogy are or can be value neutral, the activities reflected on tread knowingly into ideological terrain. However, as openly ideological approaches present possible issues of representational bias, there is a need for a triangulation of concepts before, within and after action in order to make any claims of validity.

Issues of validity and representation are difficult for practice-based design research and for self-study in education alike. Both design and education are concerned with engendering change, and as such should recognize the reality that it engages in the alteration of the conditions that are subjected to research. Rather than trying to make objective the inherent inter-subjectivities of modes of inquiry that draw heavily on reflection in action, Patti Lather (1986) provides a useful framework with which these issues can be reconciled in research designs that do not try to present themselves as value neutral. By examining a range of research conducted from neo-Marxist, feminist and post-positivist positions, Lather offers a strategy for ensuring the validity claims
that might emerge from openly ideological and transformative action research. Lather provides an early conceptualization that has since been crowded out of mainstream thinking for action research with the proliferation of practice—based, multi-vocal and creative research practice that has occurred in the three decades or so since. This model contains a series of inter-contingent processes of triangulation: construct validity, face validity and catalytic validity, that collectively work from and for a contention that:

...just as there is no neutral education there is no neutral research, we no longer need apologize for unabashedly ideological research and its open commitment to using research to criticize and change the status quo. The development of data credibility checks to protect our research and theory construction from our enthusiasms, however, is essential in our efforts to create a self-reflexive human science. (Lather, P (1986) p. 67)

Central to Lather’s construction of research modalities that actively seek the bridging of the social sciences, critical theory and education within a post-positivistic paradigm is the concept of catalytic validity. This approach builds on earlier concepts (Reason & Rowan, 1981, p. 240) to enable a formal process by which research as action in a social situation activates and recognizes the degrees to which participants or stakeholders in the research come to ‘know’ their particular reality through an engagement in attempting to transform it. This process mirrors Paulo Freire’s (1973) notion of conscientization, in which the inherent non-neutrality of the researcher/teacher/pedagogue is an equally shared process of negotiating and making new meanings between all participants in the situation. These participants can be thought of as stakeholders, and conscientization, or the idea of coming ‘to see yourself seeing the world’ through research, teaching, learning or modes of critical
inquiry such as designing or planning, constitutes both the method and the aim of situated and transformation-oriented action research.

The continual figuring of the research and its theory constructions through engagements with stakeholders and their experiences produces for the research a testing of the construct validity of the theorizing for and through action (Cronbach & Meehl, 1955) so as to uncover the origins of, and to guard against a potential drift toward, the kinds of impositions that empirical theory can evoke. Lather (1986) calls for construct validity to be supported by a ‘systematized reflexivity’ that:

...gives some indication of how a priori theory has been changed by the logic of the data, becomes essential in establishing construct validity in ways that will contribute to the growth of illuminating and change-enhancing social theory. (p. 67)

Construct validity is further extended through modes of face validity which, as a way of framing reflexivity, entails the recursive return of analysis and informal results from the inquiry back into the field to gather insights as to its particular fit with the real conditions on the ground and ultimately to build new understandings in view of refinement. For the reflective designer or the reflective educator this process is fairly natural, but elevating it as a means of testing and refining the activities of research in view of change making requires particular care.
5.2 Patterns, Counter Patterns and Convergences

The possibilities of bias in the case studies in this and other chapters are diffused via an applied and ongoing process of critical appraisal of reflective narrative account so as to underpin the theory construction by triangulating the key findings from literature and observations of practice. This use of multiple measures and multiple sources can be best described as a process of continually seeking patterns, counter-patterns and convergences. From a design perspective, such a method is integral to the very process of exploring, discovering, proposing, refining and articulating a design idea, and is frequently described within industrial design (rather inarticulately) as ‘the design process’. This is not a rigorous process of ascribing meaning to the interactions of phenomena as we might expect from the social sciences, but rather within design the ‘gestalt’ of the process constitutes a ‘rigour’ by which patterns are found and made, problems are revealed and set, and solutions are posited in practice.

A claim that needs to be made is that reflection for both design and for pedagogy is crucial work, and that it is fundamentally ‘the’ work of those that seek to improve their practices and the practices of those that they work with and for. It is, however, a mode of work that is neither systematic nor predictive. Given the interpretive and expressive nature of designing and teaching, reflection in action produces a long trail of loose threads: ideas and innovations that are edited out of action or mutated through their application in specific contexts. The use of critical ethnography as a method of checking the validity of claims from practice is important, as it forces the theory-making that occurs in and through pedagogic inquiry to adequately account for ‘the other’ in the
narrative and theory construction. This approach provides a way to externalize
the researcher’s gaze so that she can attend to the multiplicity of orientations
to practice in design and education that constitute the field in which this
research is located. Unlike other ethnographic research methods that privilege
the generation or granulation of descriptions of the interactions between
phenomena, critical ethnography acts as both a foil and check to critique the
research narrative and its positions and propositions. It brings the ‘reading’ of
a situation back as a reading from the self, and as such it is always and already
a reading of the self in situ.

That said, the accounts of practice given and the thinking and propositions
that emerge from them are really only a slice of the many discourses that
inform industrial design practice. Many (perhaps most) of these discourses are not discussed; they are present in the work on the ground, but fall outside
the remit of the research. The research deliberately sidesteps the often
discussed and rarely agreed psychologies of design, the nature of creativity
or the technical and semantic activities of invention and poetics that are so
exemplified in industrial design, and simply accepts that all of these ideas
and all of the theory that might explain the ‘learning’ are potentially evident
or emergent in any teaching and learning situation. Rather, the pedagogy
described locates itself within the social and contextual in view of critical
transformation, where multiple ontologies of designing and learning coexist.
Through the interactions with and between what it means to ‘be’ with and
within a particular discipline, new meanings for designing are explored and
produced. Critical transformation from a pedagogic perspective is contingent
on the naming and describing of the particular condition in order to learn
the how, what and why of its transformations. For the educator who is alive to
transformation, there is therefore a need to construct a picture – for herself
and for her students – of these conditions of practice, as it was and as it is, in order to foreground what it might become and how it might be enacted. This chapter attempts to construct such a narrative, through reflections on various moments in teaching at which industrial design as a particular project for different types of industriousness is apprehended through teaching towards a state after industrialization, for post-disciplinary activity, and for a critical and convivial practice of design as a unique form of citizenry.
5.3 The Transnational and Localized

Since the formalization of Australian industrial design and industrial arts programs, mass manufacture as a central discourse within the curriculum has provided relevant learning and a proximity to a future client and employer base for students. The idea of design for mass manufacture was elevated, perhaps optimistically, as an integral element of Australian economic development and independence, and as an important practical and political expression of the roles that industrial design plays in motivating cultural aspirations and cultures of production. While servicing local design needs from the mid-19th century, industrial design in Australia really found its feet as a codified profession in the years following the Second World War as a necessary mediator between building and maintaining consumer aspirations and the cost and logistics of pursuing a Western lifestyle on the other side of the world. The import of goods from abroad was both slow and expensive, market conditions that favoured local design and manufacture. While distance provided the incentive, much of the mass-production infrastructure and many of the large manufacturing business entities were established with significant government support as part of the war effort during the 1940s. The discipline’s local orientation was in many ways representative of the political desire for Australia to share the socio-economic values of its closest allies, who were also its largest trading and strategic partners at that time – Europe and North America (Bogle, 2002). Throughout the second half of the 20th century the shifting of populations between rural and urban sites of production via large-scale immigration programs, which in turn brought multiple cultures and social aspirations, kept the complexion of the profession internationally attuned and diverse. Immigration saw the rapid growth of a multicultural
urban Australia with comparatively benign class structures, high standards of living, functional governance, and employment stability that ultimately helped to solidify Australia’s manufacturing base.

While industrial design education in Australia imported many curricular values from Europe and North America throughout the 20th century, it steered away from any deep inclusion of design as a theoretical, abstract and speculative practice. Similarly, discourses of design as a practice for the modernization of indigenous crafts, made popular in Scandinavia, and pivotal in the development of industrial design through Central and South America and India, were not privileged deeply. Instead, a technically and industrially grounded discourse of design for mass production and a mass market was favoured. This preference has a lot to do with the social and curricular histories of the institutions that offer industrial design training in Australia. The working-class technical training colleges that were established in Australia in the late 19th and early 20th centuries formed the early incarnations of many of the universities in which industrial design education was and continues to be situated. Curricula that grew out of combinations of industrial arts and engineering education in these schools and colleges provided a particular lineage of disciplinary ideology and pedagogy: novice designers learned through working in close proximity to their future client base and with a view to participating in the building of Australia’s creative and productive capacity in the best traditions of industrialization as a humanist project.

Modern industrial design programs in Australia, like the one at the Royal Melbourne Institute of Technology (now RMIT University) discussed in chapter two positioned the role of the industrial designer as a humanities-trained design generalist with the necessary technical skills to productively engage in the realm of mass manufacture. Due to the comparatively small size,
emergent and diverse nature of Australian manufacturing enterprises in the post-war years, a de-emphasis on specialization in industrial design training was perhaps necessary. Teachings within the RMIT program which privileged concepts of product ecology, environmental, behavioural and organizational psychology, philosophy, ergonomics and sociology were balanced against production-oriented subjects. Like their South Kensington System, American and German forebears, mid-20th-century Australian curricula aimed at preparing designers with a broad world view and the ability to act as practical advocates for unique local design and production and consumption ecosystems. This orientation to the developing discipline of industrial design focused more on the ideological role of design than the technical, and was significant to the ways in which design might intersect with local mass production.

The rapid development of the manufacturing sector in postwar Australia began to stabilize in the mid-1970s and then to contract sharply in the early 1990s. Throughout this period the profession (and its education) incrementally reoriented itself to be more reactive to the specific organizational needs of the main employers of industrial designers. While working as a designer within a manufacturing company had been the dominant model for most of the century, this reorientation to employers’ immediate needs was particularly evident in the late 1980s and 1990s, when economic recession and high unemployment saw an increase in the notion of industrial design as a fast-paced and reactive product-design-oriented consulting practice pervade its education. This shift saw a reduction in the desire for a broad humanities education and a more focused and vocational approach to teaching a technical skill set desired by a larger but less diverse local manufacturing industry. Meanings of design pursued in the past three decades can thus be seen as being largely producer oriented, in that design professionals shifted from
a role as mediators between cultures of production and societal discourses to becoming specialist designers in the service of various, and often quite independent, sectors of manufacturing. The specialization of the profession on one hand significantly refined design capability, and on the other it reduced the mobility of designers and the transfer of knowledge from sector to sector. Consequently an education that was more vocationally localized and more technical in its curricula came to be the norm.

Combined with the development of design discourse, and the continuing adaptation to a changing technological landscape, a series of social, educational and economic policy reforms implemented over the past two and a half decades have altered the nature of, and created uncertainties for, the ways in which industrial design is practised and taught locally. The settings for economic growth, and particularly the accelerated growth in Asia of the past 15 years, have contributed to a transitioning and fundamental reorientation of the Australian economy and the elevation of Australians to being some of the wealthiest people on earth. However, hidden under the veil of relative economic prosperity has been a shrinking of the local manufacturing base, and Australian companies’ steady drift towards offshore production. This has resulted in a marked contraction of the scale and range of local mass manufacture that has run counter to the increased size, economic capacity and levels of consumption of the domestic Australian market over the same period (Davidson, 1969; Smith, 2001). This contraction has its roots in a set of macro-economic factors that need to be seen in context to appreciate the level of change with which the Australian industrial design community has had to contend.

Throughout the 1980s and until the mid-1990s the Hawke–Keating governments deregulated the Australian domestic economy. This included the floating of the Australian dollar on international currency markets,
the incremental removal of import trade tariffs, and a staged reduction in
government co-investment, or subsidy, to particular industries and sectors.
These shifts saw the currency fluctuate in value and progressively increase
against the US dollar over time. The macro-economic reform agenda
continued under successive governments. However, while these reforms
built local prosperity, the scale, breadth and diversity of Australia’s product
manufacturing industries contracted significantly. This structural shift has
been accelerated by the rapid expansion of Asian economies and their
capacity to service the material aspirations of a booming Australian economy
with a level of diversity that local industry struggles to match. In the absence
of robust organizational and brand structures or significant government
subsidies, the expense of producing for export and a small domestic market
made mass manufacturing, particularly for low-value goods, difficult to sustain
at scale (Dyster & Meredith, 2012).

A concurrent political and cultural aspiration to move away from secondary
industrial production activities towards service-oriented tertiary industry
sectors such as finance and higher education (Zhang, 2005) has encouraged
the growth of new industries in the delivery of business and professional
services. Directed toward Australia gradually becoming a ‘knowledge
economy’ as a future way of maintaining the high standards of living that
wealthy post-industrial societies demand, this shift is rather awkwardly
positioned against a cultural aspiration to mark its prosperity through a level
of material and technological goods consumption not seen since the years
following the close of the Second World War (Berry, 2005).

The transition of institutions in which industrial design curricula are located
from technical institutes to research-intensive universities, with a substantial
need for non-tenured contract teaching staff, has reoriented the roles and
dispositions to professional design practice of academics inside industrial design programs. While the domestic wealth and comparative economic stability of Australia in recent years has been substantially financed by the export of mineral and more recently agricultural commodities, the growth of the service economy has changed the long-held economic notion of the three tiers of industry, which has been replaced in the popular imagination with a two-tier commodities and services model. This incremental transition and diminishing of the nature of mass manufacturing in Australia as a critical pillar of local economic and social life has had a profound impact on the ways in which industrial design practice locates itself in the local context. However, rather than being replaced, mass manufacturing as a context of application for design has been largely relocated to the new and emerging manufacturing centres and mass markets in Asia, requiring a change in the ways in which Australian-trained designers engage with cultures of production.

The causal economic effect of the growth of near neighbours – namely the liberalization and industrialization of the Chinese economy (Zhang, 2005), the growth of the massive middle class of India, and a general increase in the role of consumerism in Asian societies (Chua, 2009) – has created a new and vibrant Indo-Chinese client base for Australian designers (Dilnot, 2003; Koshy, 2008; Varadarajan, Mayson, & Trathen, 2007). The consequence of this has been a change in the local contexts of design engagement and the opening up of new contexts and approaches. As North America and Europe deindustrialize, their former privileging in Australia as pivotal to the disciplinary discourse within the curriculum of design for mass production has diminished, and Asia is increasingly promoted as a key sphere of economic interdependence. This has enabled industrial design curricula to grow beyond traditional and dominant practice discourses of design for mass- and
medium-scale manufacture for local markets, and local consumption into more multifarious and contemporary notions of the discipline.

While these shifts have been incremental, a consequence for industrial design in the university sector is that older notions of the proximity of the designer to sites of mass manufacturing as central to the pedagogic discourse are challenged. For industrial design practice and pedagogy, the transition has delivered a split in the ways in which the manufacturing construct can be understood and engaged. A new epoch of local manufacturing that has moved away from volumetric production and into specialist and niche areas has caused an upheaval in its traditional client and employer base. In turn this drift away from mass manufacturing in the local context has recast the types of activities, outputs and models of practice that are viable value propositions in the formation of new kinds of design enterprise and to the businesses that procure industrial design services.

With economic enmeshment with Asia, popular policies around multiculturalism and an increase in regional mobility have seen the social and political discourse of Australia’s place in Asia radically transform. Similarly, the rapid hyper-industrialization of Asian economies has provided a new engagement in the types of mass-manufacturing and mass-market-oriented R&D that industrial design practices had located so much meaning in, at scales that the local context could never provide: for Australian design the ‘factory’ has by and large been relocated, along with the ‘market’ and the ‘client’, into the massiveness of Asia. The growth of the industrial production base, domestic consumer markets, and considerable export capacities within Asia, and particularly of India and China, have led to a new focus on the training of industrial designers to service this growth.
Most large Australian undergraduate industrial design programs now have a coupled local and internationalized curriculum that they posit as central to the ways that design in Australia is to be understood. For these programs this curricular ‘coupling’ raises questions of direct local relevance of content, and of the depth of meaningful penetration into the international spheres of practice that their graduates will achieve. Most programs cannot afford to not be international in orientation given the origins and trajectories of their students, just as they cannot afford to neglect to service the needs and help direct the futures of the Australian design sector. To make any shift away from the local in the formative training of designers carries the danger of further marginalizing the remnants of a local design industry for which the idea of a design service to local production and consumption remains significant.

Of most importance to this reticence to ‘localize’ the curriculum has been the concomitant increase in the internationalized nature of students of design. Two main factors inform this internationalized nature: the professional trajectories of international students, and local students with a transnational appreciation and the means to effectively practice across multiple cultures (McBurnie & Ziguras, 2001; Ong, 1999; Volet & Ang, 1998). This change in the global orientations and expectations of students sits alongside the broader project of internationalizing the Australian higher education sector as a significant aspect of the nation’s macro-economic policy directions (Knight, 2006). Most undergraduate industrial design programs in Australia have a high proportion of international students that are in Australia for the purposes of professional education with a view to translating that training back into their countries of origin. Many of these students are from Asia, where the notion of mass manufacture is, and continues to be, a significant element of economic development. Other international students from Europe or the Americas
often come to study design in Australia precisely because of its proximity to Asia. For both groups of international students, Australia represents a middle ground between the contextual opportunities of emerging Asian industries and markets and the design values of developed and deindustrializing Western economies. Additionally, Asia means different things to the generation of ‘local’ students that has entered industrial design programs over recent years than to previous generations of students. Many have some Asian heritage or have developed a greater value and awareness through studying Asian languages and cultures as part of their primary and secondary education. For these students Asia is a desirable context for design practice (Evans, 1995). Both groups of students engage in educational contexts that provide a highly reflexive enmeshment of cultural tropes. This enmeshment is further facilitated through the use of universalized information and communications technologies and visual communication conventions particular to industrial design, such as the sketch and the model, that transcend linguistic barriers.
5.3.1 The Design Specialist and the New Design Generalist

In the local context the rapid economic and disciplinary development in Asia, and its recent economic co-dependence with Australia, have produced pressures for change in the ways in which producer-oriented design discourses inside industrial design education ought be approached. It has meant that the inclusion of mass manufacturing as a curricular priority inside industrial design education is increasingly difficult to authentically facilitate within its conventional and locally situated project modalities. This realisation highlights the disjuncture of locales of professional practice and their discourses, the authenticity of curricula, and disciplinary aspirations, and presents industrial design education in the local context with the need to approach the future of practice from two distinct pedagogic positions. The first is a reconciling of ‘the local’ as a context for practice that requires quite fundamental reorientation. The second is ‘the transnational’ that uses the mobility of practice to reclaim a notion of design for mass manufacture back into the curriculum through adequately equipping Australian-trained designers with the capacity to work in Asia.

Through this period of a highly fluctuating Australian dollar, asymmetrical and diminishing tariffs on the imports of many products and on the exported goods of local manufacturing enterprises, the capacity for manufacturing businesses to undertake in-house R&D diminished and in many cases was offshored\(^{(23)}\). However, Australian industrial design education in the main continues to educate to develop capabilities in designing for a mass market and for large companies, despite it being an increasingly scarce professional activity for the many graduate designers who choose to situate their careers

\(^{(23)}\) Local design studios in companies such as Philips were relocated offshore in the early 1990s.
within Australia. Many of the services that industrial designers once brought such organizations have been outsourced to a growing and increasingly specialised product design consultancy sector. Consulting businesses by nature are highly reactive to pressures of time and the need to deliver material results to clients. In the case of the provision of product design services, this reactivity saw a compression of design research and experimentation activities on projects, and a highly pragmatic and cost-sensitive expression of disciplinary practice. For both the large manufacturing company and the design consultancy, a deep capacity in design for mass manufacture sits as a firmly entrenched and implicit disciplinary expectation, and despite the local condition, it is an important and tightly held aspect of the profession. However, the proximity of the designer to the sites of production, user and market is crucial in an effective industrial design education, as it provides a way for a designer to fully comprehend the systems of production and exchange that they will be designing for and within.

With the changes to the local manufacturing sector there has been a net reduction in the range of opportunities for Australian industrial design graduates to engage in locally based careers within the milieu of design for mass production or mass market. The nature of employment in industrial design in Australia has for many changed from that of being in the service of a company (manufacturer or consultancy) to being a career constituted by forays into design projects where the context of engagement and not the activity – be it production, market or message – defines the method and approach in which design is undertaken. Many designers in contemporary Australia now orient themselves as multidisciplinary practitioners working on projects: they may work in the realms of art and performance, designing bespoke and batch manufactured products, as researchers, or as generalists
working across areas of design, marketing, and production in small and medium-sized enterprises. Some designers have little option but to practise in a piecemeal fashion as the nature of employment in design has moved for many from that of being in the service of an organization to being a contractor within the time frames of a specific project. While moving from project to project has enabled industrial designers to increase the ambit of their design repertoires, rarely is there the authentic opportunity to orient careers in the traditional parameters of industrial design as a secure career, designing mass-produced objects for a mass-production company.

These changes in the career structures of the industrial designer have contributed to a diverging and amplifying of the notion of industrial design as a generalist specialism to becoming two distinct professional modalities: the design specialist and the design generalist. While specialist skills might be preferable to a particular employer, industrial design as a generalist specialism is important within the context of design for mass manufacture in large organizations given the diversity of roles and responsibilities that such contexts of practice demand. For Australian industrial designers, the context of design for mass manufacture now sits predominantly in Asia, the experiential engagement with the user and the market sits in Australia, while disciplinary aspirations remain largely directed at Europe and North America. Such a segregation of locales of practice questions the authenticity of training designers for a full sense of practice in the area of design for mass production and highlights the disjuncture of industrial design curricula. To change the curriculum to train students for a relevant, generalist and localized practice requires a transformation from a curricular concept that focuses upon mass manufacture in favour of a curriculum that considers design to be a practical education in the humanities. Such a transformed curriculum could equally
reposition industrial design as a generalist multidisciplinary practice capable of adapting to the disparate areas of creative engagement that constitute the contemporary nature of the profession. However, there is a reluctance in university programs to recast the curriculum to such an extent as to be either localized, and therefore entirely representative of the nature of contemporary industrial design as it is practised in Australia, or to remove the local and transition to a curriculum that is international in its entirety. This, therefore sets up both a need for a transitioning of the curriculum so as to be more reflective of the types of local practice opportunities that industrial design graduates will have, and a need for a mechanism that can link Australian industrial designers with the mass-production opportunities that exist within Asia in order to provide access to an authentic locale of practice by providing enough mass-manufacturing-oriented design in the curriculum and attempting to connect students to an Asian client base.

Two case studies of projects are discussed in the following sections. The first deals with a design studio that uses a propositional framework to engage in the redirection of automotive manufacturing into the mass manufacture of bicycles and cycling as global products. The second describes an ongoing project that uses the mobility of practice as an opportunity to reclaim a notion of design for mass manufacture back into the curriculum through adequately equipping Australian-trained designers with the capacity to work in Asia through establishing and activating a ‘transnational’ notion of practice.
As in most nations that produce cars, the automotive manufacturing industry in Australia has always been supported by Government co-investment. The automotive sector in Australia was for many years one of only a handful of the world that undertook the full cycle of automotive design, engineering and production. In response to the serial closure of multinational auto manufacturers that had design, manufacturing and assembly operations in Australia, such as Volkswagen in 1976, Renault-Peugeot in 1981, and British Leyland in 1975, a major policy review of the future carrying capacity, competitiveness and degree of public subsidy of car making in Australia was commenced in 1983. The Motor Industry Development Plan led by Labor politician John Button (the Button Car Plan, as it became known), was introduced in 1985 and set up a staged response to gradually reduce the level of government subsidy to locally produced cars by opening up the local
automotive market to increased competition from imports with a gradual reduction of import tariffs and quotas (Bopage & Sharma, 2014). Setting the scene for long-term industry transition, the Button Car Plan was followed by various industry policy directives to induce greater reductions in public co-investment in multinational car companies, and innovation grants to increase the efficiency and export potential of locally designed and built cars. Bopage and Sharma (2014) describe this period of industry transformation, from the high degree of government subsidy in mid-1980s to today and the gradual cessation of all car making in Australia. Over time the sector became significantly distributed across a large network of third-party contract parts manufacturers that with this industry transition will impact across the manufacturing business landscape. As a consequence, the significant external contract-manufactured local parts supply industry is undergoing its own transition. While many companies have been exploring routes towards diversification into industries outside of the automotive sector the impact of a cessation of automotive manufacturing in Australia mark a turning point in the local context.

The Cycle Futures Lab (Figure 5.1) studio (a collaboration between myself and Scott Mayson, RMIT University) used the proposition of repurposing the local automotive parts production sector as a strategy for rapidly positioning Melbourne as a new global centre of bicycle manufacture to compete with the likes of Taipei (24). The studio set up a narrative of combining industry transition with the growth of cycling in Melbourne as a popular mode of transport to argue for the viability of a new sustainable-transportation-focused manufacturing sector. This narrative was generated through discussions, readings and through specific provocations written for the studios shown in figure (5.2).

24. Taipei is widely known as the global center of bicycle product manufacture.
So far this year there have been more than 23 million cars manufactured the world over. By recent estimates there have been more new cars produced in the first half of this year than there have been people that have so far died. For every 46 new cars made this year approximately 1 person is killed in a road related accident – now in excess of half a million people the world over. In Australia we have a current population approaching 23 million and we have 16.4 million road-registered vehicles. That is one car, truck, bus or motorcycle for every 1.4 people.

Car ownership and use have significantly proscribed the nature and layout of our cities, suburbs and homes. Our cars, after our homes, are the most expensive material things we might procure and maintain, and consequentially we ascribe significant personal and cultural value to them. Our cars lock up large amounts of material; metals, fibre, polymer, and pigments, while at the same time consuming non-renewable and polluting fuels. Our cars take up vast amounts of space in our cities. As we change our cities and our cities in turn change us, our cars require an ever-increasing amount of our (and our families) time inside of them. The more time we spend in them and between them, the more we increase our value of the technological affordances we have come to expect from them; for pleasure, for security. Our methods of making cars – and the divisions and fragility of labour that such methods produce – have in-turn made a socio-political dependency on their manufacture: a condition of fragility that car corporations as multinational mega-employers, work with and against governments the world over to maintain, for political leverage and for shareholder return.

And yet, despite all of this, our cars bring some people, indeed many people significant joy. We ascribe value to our cars as we might a child when they are new, and treat them with disdain when they are ageing – as we might our parents. Our cars produce their own kinds of labour – as a something with needs: the need for fuel; the need to be cleaned; to be parked; locked; insured; garaged; warmed up; turned over; greased and oiled, and wiped down. Our cars have produced entire domains of expertise – from systems management in manufacturing and logistics, to studies in the phenomena of automobility. The technological, managerial and sociological knowledge developed from the process of car making and car culture has enabled significant knowledge transfer across the spectrum of our industries. Our cars have entered into our language; “how’s it going”, “blown a gasket”... Our cars are stitched onto who we are, or who we think we are or who we might become. And so what is the problem with cars?
Alongside prompts and prognostications, the studio deployed a method of engagement with an increasingly inaccessible manufacturing sector through a collective process of researching and logging data on all of the parts used to make a small hatchback car. Findings from this research task were used to identify materials and production processes that might be redeployed for bicycle manufacture. These processes were then used as the basis for new product development and technical product design. Concepts were refined through a close focus on the highly segmented bicycle market, and by conducting observational research on cycling subcultures and the repairs and modifications that cyclists make to convert bicycles into highly personalized and contextually attuned products\(^{(25)}\).

While the studio had an overtly technical product design orientation, it leveraged a motivation in students to see themselves as proponents of alternative industry visions and attempted to give them the capabilities to see both manufacturing and product sectors as plastic and able to be morphed and adapted to changing circumstances through design. This studio (Appendix. 9) provided students with an insight into the complexities and opportunities that design within a mass-manufacturing context can provide, and for many students, and particularly local students, it was their first real insight into the economics and policy positions of government on industry, and of the implications of changes to large industry sectors on notion of employment, national technical capability and the social impacts of massive change. By using combinations of collectivized research into manufacturing processes and markets and observations of users in context, the studio set up

\(^{25}\) Students entered their design concepts into the International Bicycle Design Competition run by the Taiwanese bicycle manufacturing industry. Many of the students won awards in professional and student categories.
a scenario in which students were able to see themselves as working towards a shared vision for how industrial design might nudge the seemingly unmovable towards preferred futures. In this way the studio revealed students’ political orientations and desires for future local practice and elevated them within the discourse of doing design work.
In response to these broader changes to the location of both an authentic immersion in mass manufacturing and a normalization of the idea of working in Asia, I developed a project of coupling the local with the transnational. Commenced in 2004 and continuing, the ‘transnational’ as a particular discourse for practice is structured for students to encounter in three different ways. Students can undertake ‘transnational coursework’ that includes design studio projects that focus on designing for real-world client organizations and manufacturers in India or China, such as the Transfer Studio project described in a previous chapter, and design history and cultural theory courses that provide a focused study of design in either India or China. Student exchange, which involves spending a semester in a partner university with
an aim of immersion and familiarization in a culture and design practice of
another country provides another opportunity. This provides students with a
grounded appreciation for other sites of professional activity and the capacity
to build lasting professional and social relationships in their host nation.
Finally, students can engage in localized coursework. This involves working
in a team on a design studio project that is grounded within the local practice
discourses of design. Project teams are made up of international students
enrolled in the full four-year degree program, local students with limited or
no prior experience of Asia, and students on exchange to RMIT from partner
universities in India, Thailand, Japan, China or South Korea.

The co-construction of project-based learning activities by academics
from the various universities involved has been a major aspect of this
project, and ensures that the key learning objectives of each institution
are met. Constructed design projects have included design for the mass
production of ceramic goods in Foshan, China; projects with electronic
product manufacturers in Chiba, Japan; the design of products and services
systems with NGOs and fabrication industries in Ahmedabad, India; design
projects with Australian automotive companies; and sustainability and social
innovation design research projects in Melbourne, Australia. Critical to the
learning in these projects has been the amplification of the local design and
production discourses of each location, so that students on exchange have
to contend with differences of culture and discover the values of design,
production and practice particular to each context. Alongside these design
project learning experiences, students undertake practical and theoretical
coursework. For RMIT students in China or India, this has provided authentic
learning in design for mass production and the mass market in ways and at
scales that fundamentally reorient students’ appreciations of design in the
manufacturing domain. Additionally, students have undertaken design studios in Australia directed at both Indian and Chinese contexts of application. These include transportation design projects, product and service design in the areas of health management and diagnostics, sustainability-oriented campaign projects, and product design for grassroots inventors in the process of commercializing inventions.

These projects have involved a linkage between the research agendas of the project teams at participating institutions and the development of direct project relationships with manufacturing companies and client organizations. Constructing projects around ongoing research activities serves two primary aims: it provides surety for the students that the activities and contexts of learning have been adequately negotiated and will be monitored in an ongoing way by academics from their home institutions, and it provides academics with a direct and embedded link into the areas under research.

The disciplinary objectives of these projects vary depending on their duration, degree of immersion and levels of complexity. The experience deliberately sets out to connect the Australian experience of moving through a peak of industrialization and into a phase of deindustrialization as a possible model or outcome for design in India and China. Here the temporal, political and macro-economic nature of creative industries is highlighted for students so that inter-cultural learning is enabled. This enables Australian students to understand the changing conditions of design in Australia through grounded comparison. It similarly presents Indian and Chinese students with an image of the changes that they may encounter through their careers as their nations’ economic growth eventually peaks and plateaus. Finally, this embedded agenda provides an experiential lesson in the macro-economic and cultural forces that direct the phases, transitions and opportunities of the profession in
major economies in the Asian region, giving students agency as designers with a regional appreciation beyond the confines of national and local constructs of the profession.

Set up as an ongoing project, these encounters have involved the development of academic and institutional linkages and the securing of Australian government and university grant funding and scholarships to facilitate the mobility of students and staff between key institutional partners. It has also provided the program with a mechanism to proactively confront the standing and implicit notion of Asia, and particularly of China, as ‘other’ to the established values of industrial design in Australia.

The learning that happens in these constructed transnational contexts has a few key aspects. The effect of learning new and contextually contingent ways of working with other learners from other places emerges as a fundamental re-articulation of the design methods, meanings and processes previously learned and considered universal by collectively altering their socio-cultural practices (Hachmann, 2008). Students encounter new parameters of evaluation, in which notions of ‘good design’ are defined in different ways, leading to an appreciation that the knowledge constructs of industrial design are fundamentally arbitrary and locally contingent. This realization in turn enables a greater capacity for openness to an exchange of cultural and disciplinary knowledge, ideas, strategies and expectations. The quite literal act of confronting the ‘other’ and of being confronted as ‘other’ that learning to work elsewhere presents serves as a critical and self-actualizing moment for students. Such moments provide a scaffold for developing new ways of looking at the world, appreciating difference, and adapting to differing environmental, organizational and socio-economic conditions. These changes might manifest as incremental enlargements and improvements in ways of
functioning through design practice in an unfamiliar context and offer a point of rupture where a fundamental reordering of the very nature of design as understood by the learner can occur. New values of the local condition within localized curricular activities similarly form, where previous misalignments suddenly dissolve so that subjective and deep assumptions previously attained are questioned. This often results in the transformation of the very way design projects are constructed, through a ‘forgetting’ or ‘unlearning’ of accustomed routines and outdated knowledge and the replacement of old institutions, roles, and procedures with new and more effective ones.

An greater engagement with Asia was achieved through an examination of the career trajectories of students and a belief that the role of design for mass production provides an industrial design curriculum with the necessary depth of content to impart contextually transferable knowledge and practices. Given the changing nature of the profession and its curriculum in the Australian context, such a project presents opportunities that sufficiently account for the social, technical, economic and managerial elements that constitute a robust foundation for the practice for future Australian-trained industrial designers. This curricular project continues to strive for more effective engagements with Asian cultures and industries as a formative learning experience that is critical to the discipline and its sites of practice in providing legitimate pathways for learning and professional practice. It has enabled a clearer view of disciplinary and curricular priorities, and a deeper value in the transformative power and authenticity of contextually situated learning.
5.5 The Social and Sustainable Turn

Notions of how industrial design might deal with the social and environmental implications of manufacturing have been an implicit – albeit marginal – discourse since the inception of the discipline in the 19th century. However, it has been only in the past two decades that sustainability has become a core and explicit negotiation in the professional and pedagogic construction of industrial design. With the elevation of sustainability as an agenda for practice, and the need for industrial design to properly attend to the environmental and social implications of its highly refined capacity to proliferate material things, the discourse of sustainability has largely been about reducing the environmental impacts of manufacturing and consumption patterns. Confronting the disciplinary predisposition to generating the unsustainable demands a problematizing of disciplinary practice and the navigation of complex social and technical systems of production, exchange, use and waste. Generated from, and located within, the research interests of academics in design and affiliated disciplines, methods to confront the unsustainability of ‘normal’ design practice has evolved in a series of iterations that have significantly influenced the nature of industrial design education in the Australian context. In general terms each of these iterations have attempted to systematise and nudge design practice to account for the implications of design decisions that promise less unsustainable outcomes.

By the late 1980s industrial design in the university context began to more deeply acknowledge a growing call for the discipline to take responsibility for the environmental implications of products. Provocations that had been present but marginal in design education and theory for many decades, from the likes of design educator Victor Papenek (1971), set the conditions for
environmental considerations to have centrality in the curricula of industrial design, but methods for implementing it were lacking. The eco-design or eco-efficiency approaches of the 1990s, referred to as Design for Environment (DFE) or cleaner production (Lewis, Gertsakis, Grant, Morelli, & Sweatman, 2001), gave industrial design new methods and tools to influence material and manufacturing process specifications within the design stages of product development. Analytical methods such as life cycle analysis (LCA) were developed as a way to objectively benchmark the environmental performance of a product across its life cycle and tended to focus on issues pertaining to an individual product for which the impacts of production and use, toxicity, energy efficiency and waste could be determined and improved through various strategies (Roy, 2000; Ryan, 2004). In the years since, LCA has evolved into a technical expertise in its own right that uses a set of problem identification methods and tools commonly deployed inside design processes. This largely technical discourse of sustainability in design practice contributed to a greater recognition of the need for designers to consider their decisions across all life-cycle stages of a product under design rather than a traditional focus on the manufacturing and use phases up to warranty (Lewis et al., 2001). DFE methods soon evolved to include discourses from manufacturing engineering, management, the social sciences and public policy, generating more holistic approaches to limiting the negative environmental impacts of design decisions in product development, manufacture, use and end of life. With the integration of other fields of environmental discourses, new concepts of sustainable design as a strategic discourse emerged and sustainability grew as a central academic concern within the discipline. Ryan and Fleming (2004) published The Six Strategic Principles of the New Eco-Innovation Paradigm, a summary of research activities that elevated sustainability in the design sphere.
through concepts of ‘Valuing prevention, Preserving and restoring “natural capital”, Life-cycle thinking (closing system cycles), Increasing “eco-efficiency” by “factor x”, Decarbonising and dematerialising the economy and Focusing on design – of products and product-service’ (p. 30).

The strategies and eco-design tools developed within the DFE movement were enlarged through the overlay of triple bottom line approaches used in the business and sustainable development fields and formed within new discourses of Design for Sustainability (DFS) (Pardo, Brissaud, Mathieux & Zwolinski, 2011). The social and systems focus of DFS saw a move away from the industry and product-orientated DFE approaches to incorporate understandings of stakeholders and business development (UNEP, 2009) within the design process. Methods from eco-redesign and eco-efficiency (Lewis, Gertsakis, Grant, Morelli, & Sweatman, 2001; Roy, 2000; Ryan & Fleming, 2004) were extended with the inclusion of emerging ideas from PSS discourses (Roy, 2000; Mont, 2002; Ryan & Fleming, 2004) and social science discourses focused on the dynamics of behaviour change (McLaren, 2008).

Similarly, approaches such as Life Cycle Thinking can be seen as a direct extension of the product-to-product and audit methods common in DFE-derived LCA approaches that focus on concepts of eco-efficiency.

These transitions and inclusions positioned industrial design practice as a valid strategy for dematerialization through the design of elements of closed-loop systems within in a new era of extended producer responsibilities. For instance, product stewardship, closed-loop systems and product take-back schemes allowed companies to take greater responsibility for resources consumed and wasted across the whole of a product life cycle (Mont, 2002; Ryan & Fleming, 2004; Frankl, 2005; McLaren, 2008; Lewis, 2005; Toffel, 2002). New approaches to product and systems thinking, in which efficiencies
and innovations were introduced through service schemes, leasing options and circular economies rather than through traditional models of product-user-ownership (Manzini & Vezzoli, 2002) (Mont & Tukker, 2006) (Morelli, 2006) (Roy, 2000) (Vasantha, Roya, Lelahb & Brissaud, 2011) were developed to deliver ‘a mix of tangible products and intangible services designed and combined so that they jointly are capable of fulfilling final customer needs’ (Tukker & Tischner 2006, p. 1552).

Dematerialisation through PSS offered the proposition that unidirectional resource flows need not be synonymous with economic growth and elevated a managerial discourse of sustainability on the accountability of processes to being more strategic and holistic in intent. Designing product-service mixes in complex business, social and technological systems demands quite sophisticated strategies if design activity is to make impacts in ways that progress sustainability. The widening of sustainability strategies to account for business and stakeholder needs constitutes a fundamental shift for ‘normal’ practices of industrial design; the prospect of PSS design demanded new ways of conceiving of design as a contributor to new enterprises of dematerialization. Mont and Tukker (2006) describe this as

…the need to link hard and soft issues such as technology and sociology, products and services, and to view existing environmental problems from a systemic perspective… the development of multidisciplinary approaches that require inputs from a broad range of disciplines, such as economics, management, environmental studies, sociology, psychology, product design and engineering. (p. 1451)
In the last decade eco-efficiency and systems thinking approaches have been augmented by a deeper inclusion of the roles of people and their behaviours as they pertain to sustainability. Framed under the broad umbrella of behaviour change, this new terrain for pro-sustainability actions draws theory from areas such as the social sciences, design, business and marketing (Moloney, Horne & Fien, 2010) (Barr, Gilg & Shaw, 2011), (Peattie & Crane, 2005) (Peattie & Peattie, 2009). Behaviour change can be divided into micro- and macro-sociological approaches. The micro-sociological concerns the factors 'that influence or shape what goes on inside a person’s mind, such as awareness, knowledge, values, attitudes, behaviour, rational thought processes, emotional states and entrenched habits' (Moloney et al., 2010, p. 7615). ‘External variables … located in the physical, social and discursive environments in which a person lives’ (Moloney et al, 2010, p. 7615) constitute the macro-sociological. Inside design, behaviour change approaches are deployed beyond mere analytical activities that look into a particular phenomenon or the ways a socio-technical practice is undertaken, and instead used as a means of generating new levers to pull to induce strategically defined changes. Levers come in the forms of purpose-designed products, services or processes that when coupled to the proliferating capacity of industrial design can deliver across a population of consumers or users the transition from one form of materially mediated practice to less environmentally harmful practices.
5.5.1 The Social and Sustainable in Industrial Design Education

When both the social and the sustainable are treated as an agenda for intervention in entrenched socio-technical practices, the systemic implications of design practice are made visible. As this agenda has matured inside design discourse, opportunities have emerged and been explored through teaching to test the efficacy of meanings of design that privilege social and sustainable positions. Industrial design, if treated in such a way, is redefined away from its producer-centric roots and recast as a socially engaged and negotiated creative practice of campaigning for dematerialization through the envisioning of plausible and preferable futures through the proposition of new products, services and practices. In this way sustainability as a broad set of socially
negotiated fields becomes a site for industrial design to apprehend itself as a particular type of critical practice.

Teaching and learning work in this field draws on theory from the sustainability domain, but applies it in less direct ways than much of the theory suggests. This is not some misapplication of theory, but rather a refiguring of ideas to fit the particular circumstances of a disciplinary and educational context that is in reality quite different from what the discourses of sustainability present. Education for design practice changes as the industries it delivers graduates into similarly change. Increasingly the role of the industrial designer in the sustainability domain is less about materiality and the manufacturing aspects of a product and more about the social life of products within complex systems of products, technologies and users. The transitions of sustainability methods and discourses inside industrial design have produced a diversity of approaches that can be drawn on for particular kinds of design investigation and form in teaching as a deep embedding of sustainability as core to meaning construction for design. Projects in this space cross into fields of technical product design, sustainable interaction design, and social design inside the community sector, social innovation, service design, and product/service systems design. Often they involve grounded learning in industry, sustainability research and development units in universities, and in not for profit settings such as local government, conservation organisations and community initiatives (see Figure 5.4). These discourses are now readily visible in the career trajectories of graduates as they position themselves as particular types of advocates and activists within design, business, research and educational communities.

Established technical and analytical methods for sustainability, while useful in informing the ways in which designers do what they do, have largely
migrated from the remit of the designer to become quasi-managerial discourses in their own right undertaken by expert service providers that work alongside or after the procurement of design development processes. Other methods such as eco-design strategies and LCT are readily absorbed as methods for design and provide useful ways in which the uncertainty that designing can produce can be mediated. Where there is an integration of these expert sustainability discourses with design education, quite significant outcomes can be achieved that provide both a model by which the complexity of product and service development can be planned and managed, and a particular form of meaning construction for professional practice in design. This type of integration is difficult to facilitate, and when it is it often highlights for design the particular gaps that the boundaries of traditional professional roles of the industrial designer have to traverse in order to fully engage in sustainability.

Maintained through the belief that the contributions that industrial designers can make in reducing negative environmental impacts are sizable, the project of engagement with sustainability through teaching thus oscillates between various tensions. Industrial design curricula rarely discard the shadows of old meanings of practice and are successively layered with the inclusion of new concerns. For instance the role of industrial design as a professionalised means of activating consumption, without being seen to champion it in a gratuitous manner, was used as key mechanism for economic resilience in the mid-20th century, and to this day still sits deeply within disciplinary meanings. This notion of the role and meaning of design set in place a disciplinary sensibility strongly tied to an education in inciting continual material consumption as a means of building manufacturing capacity and qualities of material appreciation through formal design capability. The inclusion of sustainability in the formative education of
industrial designers actively problematizes such a notion and makes it more visible than ever. What emerges in the contextual particularities of industrial design education in Australia is how pro-sustainability strategies are used in a robust but overtly moral way, not to produce professional designers who are necessarily able to directly apply these theories inside a manufacturing concern or consulting practice, but rather as a significant component of their moral or civic sense of the roles and purpose of design.

At RMIT University the Centre for Design has been a significant location for eco-design discourse in Australia for the past two decades, and has positioned its activities between research, education and industry engagement (Ryan, 2003). Here ‘eco-redesign’ was articulated as a definite process that designers could deploy in designing products to make them less environmentally inefficient. In its first decade of operation and with government and industry funding, the Centre linked universities and design consulting firms with product manufacturers to undertake a series of exemplar projects in the areas of household appliance redesign and recycling-oriented product service system design. As a young designer working on these projects in a consultancy setting in the mid 1990s the impact of these projects on my own meanings of practice was quite profound: they affirmed individually defined values of design, and the transformative roles design could play in manufacturing and in product use that were given little significance in education at the time.

However, while the eco-redesign movement was being developed as a proposition for a future way of doing industrial design practice, Australia’s manufacturing base was rapidly shrinking both in scale and in diversity. As described earlier, this decline has gathered pace over the past decade as many local companies have offshored manufacturing operations. With diminishing opportunities to practice eco-redesign within local mass-manufacturing
contexts, design instead began to privilege a discourse of making one-off artefacts or using design for new product development rather than redesign. As a result eco-redesign strategies were used less directly than initially intended and often as an ideological or intellectual aspect in the conceptual stages of design.

Three concurrent approaches in the sustainability agenda can be seen in the Australian situation. The eco-design or DFE approach for theorising and seeking to optimise design processes inside a manufacturing construct premised on a scale of mass supply produces its own meanings for design. The designer-maker approach, that by virtue of its micro scale limits the volumes and market supply of the goods produced, and controls all aspects of manufacture by ensuring efficiencies in production as an input cost prerogative, thus bypassing the need for managing runaway environmental impacts. Finally, there is the design innovation approach that works in ways that do not have clear precedents from which to define appropriate courses of action towards sustainability. Industrial design’s move away from a practice of redesign to one of design and innovation perhaps gives some explanation to lack of evidence of either eco-design or sustainability as explicit in the curricula of design schools in the early years of the millennium (Ramirez, 2006).

Sustainability as a central discourse is perhaps now more evenly spread across Australian industrial design curricula as broader notions of sustainability have entered the mainstream social and political discourse and are now more common in the professional work of design graduates.
5.5.2 Sustainability as Systematic

Industrial design has long positioned itself as a profession that would react to design briefs set by a client. This approach to the ways designers’ work creates a format for engagement with sustainability through activities of redesign or incremental improvements. However, two factors have limited the uptake and impact of this approach, that from inside design are quite clear, but perhaps not so from the outside. The first is that industrial designers who engaged closely with mass manufacturing realised quite early that affiliated fields had taken up the challenge and put in place robust systems that solved many of the eco-efficiency problems that had previously made manufacturing wasteful. The second is that these systems for greening the making of goods were rapidly transferred through various supply chain compliance requirements to the very performance of the goods made, and to the business practices of enterprises that produce and procure manufactured goods.

For example, Life Cycle Management (LCM) frameworks emerged out of management disciplines to deal with the increased complexity of attending to the sustainability of business practices. A strategic management approach, LCM seeks to shift a company towards holistic and non-impactful models of business and production. LCM deploys combinations of environmental and stakeholder relations oriented strategies to steer change towards greater degrees of sustainability, including: decision-making and capacity development processes; organizational structures; corporate social and environmental responsibilities; new product design and development processes; business and supply chain operations; environmental and end-of-life management systems; and, the outward communication of a company’s environmental profile through environmental product declarations and reports (McLaren, 2008). Just as LCM provides business and management fields with tools for pro-sustainability engineering disciplines adapted their own
methodologies of manufacturing practice, such as Total Quality Management (TQM) to include issues of emissions and waste streams. Sustainability provided engineering with new specializations that could incrementally transform product manufacturing towards more environmentally appropriate practices. The emergence of ISO 14000 and TQM practices in many ways removed the imperative for industrial design to carry the burden of decisions as advocated in the DFE and DFS discourses within the manufacturing domain, and marks a significant departure of eco-design discourses as having centrality in industrial design curricula.

Critical to these shifts in the meanings of sustainability in design has been the disjuncture between the discourse for (and from) design and the actual boundaries of responsibility for environmental decisions inside the professional domain of design for manufacture. Two decades of systematising design processes for greater eco-efficiency has shifted many of the hard and analytic negotiations with which designers and other specialists initially tasked themselves to other professionals in the engineering and logistics domains of product manufacture. Similarly, much of the theorising in the design for sustainability space has been undertaken from disciplinary positions outside of design – social science, business, engineering and environmental management. While design inside the university context has readily accepted and actively developed these ideas into their ways of thinking and teaching design, it ought not be assumed that such an adoption presupposes an intention for application outside an educational context. Systematic approaches to sustainability inside the teaching of creative practice – be they commercial, clinical or technical in their focus – provide on one hand a means by which design decisions can be subjected to various methods of validation and management, and on the other an ideological dimension that can be used to carry forward design in innovative and contextually sensitive ways.
5.5.3 Case study: Total System Model

Through teaching I developed a diagrammatic model that allows students to appreciate, in a very rapid way how they might take in the enormity of the sustainability issue for industrial design (see Figure 5.5). The model provides a generalized way to locate different design strategies across a total system of inputs to the production of a product, its use and end of life. Steering away from hard and specific discourse in the design for sustainability domain, the model works from the position that the longer a product is retained in a system of use the greater its environmental effectiveness. For students, showing where effectiveness can be found provides a mechanism by which a moral value of sustainability can be turned towards a practical application through design. For learners, this allows the relative merits of different ways to approach the environmental implications of design to be seen as a series of interactions between the various stages and phases. Each stage, and each transfer between stages, constitutes a transfer of energy and other inputs that offer meaningful points for intervention. In using the model, the aim is threefold: ensuring that the resources deployed present the most minimal negative environmental implications; ensuring that the useful life of products is exponentially increased through various strategies to build in a return loop; and, wherever possible, to dematerialize.
The return loops provide a basic template for understanding the value of common strategies, where the longer the loop the and the greater number of stages a product or material might go through to extend its life the lower its relative sustainability value. This temporal method presents students with a tangible way to see where different strategies can be deployed in the system of a product. For instance, designing into a product means by which it can be easily repaired and its use life extended presents significant environmental advantages over a product that cannot be repaired. Similarly, designing a product for an enlarged actual user group, through sharing and other circular economy models, can serve as a means of removing individually owned products that fulfil the same need within a particular context. As the complexity of sustainability can overwhelm the design student, the Total Systems Model offers a simple way for them to locate sustainability value propositions, as small or large innovations, in ways that can be readily seen so as to focus in on the detail of particular strategies.
The sustainability imperative inside industrial design has produced three distinct orientations: sustainability as a technical design discourse on eco-efficiency improvements; sustainability as an ideological or moral discourse encountered through design; and, sustainability as a managerial discourse for design. Inside industrial design education the managerial is not possible without the moral, while the technical and the moral direct students towards the managerial.

Once a fairly isolated concern, sustainability as a central intellectual pursuit inside industrial design is evidenced in a rise in the number of publications about sustainable behaviour change from a design perspective and the ideological orientations of students who seek to develop careers in industrial design and its variants. Although often not explicitly defined as such, sustainability discourses inside industrial design education and practice are by their very nature discourses of design management. The ability to ‘sustain’, or more precisely the ability to reduce the probability of ‘unsustainability’, if positioned as a method of management for design, provides powerful ways of structuring and planning an approach to design and enables a diversity of meanings to be made through practice inside the design-sustainability negotiation.

The moral territory of sustainability provides different value and calls for different activities, where new notions of the ‘social’ as critical to the ‘sustainable’ are worked on by students keen to inhabit the space of design activism. By its very nature this produces a kind of design engagement that looks to sustainability through community-engaged activities. The university context provides a ready ecology of enthusiasm and energy for sustainability-focused service design and social innovation projects that have an activism
flavour. However, while it is easy to recruit students into sustainability from an ideological and moral standpoint, those who enter in this way may develop a position that is in opposition to big business and that finds difficulty with industrial design’s underlying consumption agenda. University communities with a sustainability bent thus present students with two pathway choices; one leading towards advocacy and another towards realizing sustainability through technological innovation within the business and manufacturing domains. This latter pathway contains within it notions of product management and stewardship within the framework of an engagement with best practice in business. This pathway potentially leads out of design, and the former leads forward into an integrated practice of sustainability and design. The two decades of development of systematic approaches for design to be less unsustainable than it might otherwise be have, however, produced a dilemma for proponents of sustainability: that designers and design discourse frequently shift the boundaries of practice to reflect the meanings of design that both derived from actual practice and that are desired from future practice. Alongside industry and community-linked design studio projects that orient learners to work on very particular problems, devices such as the Total Systems Model provide a simple map onto which the moral imperatives of future practice or managerial dimensions of doing sustainability in the here and now can be inscribed, and tactics and locations for making change can be identified.
5.6 Looking for Ruptures

Contending with this post-, hyper- and de-industrial regional context of developed and developing economies raises many questions of what the meanings and concerns of industrial design within the Australian context ‘ought’ to be, and highlights the contextually and pedagogically contingent nature of the Australian design condition. For those teaching, learning and practising within the deindustrialising local context, traditionally dominant and dualistic discourses of producer and technology (in which the technological discourses of design privilege an alignment of the discipline to the producer over the consumer or user as a consequence of a diminished production base) are opened up to provide space for foundational, but previously marginal, social discourses focusing on issues of ‘service’ and ‘culture’ as critical sites for design engagement.

However, when engaged in complex problem areas, such as those in the mass manufacturing and sustainability domains, industrial design often orients itself as subservient to the dominant expert discourses that specify the nature of a problem and the means of addressing it. For instance, in the area of design for health the medical position often dominates; in the area of sustainability the environmentalist’s position often crowds out that of the social. In the design of a product for manufacture, the designer attempts to balance the expert, dominant discourses of the problem/solution space with the prerogatives of style, usability, production, manufacture, marketing and price. The difficulty in this is that an underlying social reform agenda that may be critical in adequately approaching a problem and those implicated by a ‘solution’ can be unwittingly sidelined by the designer in the design process and relegated to the recounting and post-rationalisation of the project, its outcomes and its
effect. This self-administered deactivation of disciplinary ideals presents the educator with a challenge as to how best to enable a particular social reform capability that can be engaged productively alongside the development of conventional disciplinary capabilities.

However, activating ideologically charged approaches to design and design education is not without its problems and precedents. In the field of industrial design the long-held notion that technical intervention can, and will, improve the quality of people’s lives has given rise to discourses of design for development of social and user-centred design. Such discourses, while frontally approaching both the actual experience of using a designed artefact and the historical paucity of direct disciplinary activity in what we might now consider the ‘development’ sphere, retain at their core the design of industrially produced goods as the lever by which questions of use and experience are engaged. Such discourses thereby privilege, albeit tacitly, design for production and consumption over and above the roles that design plays as a particular mode of enquiry and negotiation of problems within communities which might translate to a project of production.

For industrial design service-oriented, social or whole-of-systems discourses are distinct from entrenched product and artefact-oriented discourses in that they amplify the interconnectedness of objects, technologies, environments and experience through a temporal and multi-scaled mode of design. Aligned to sustainability, health or other agendas that require a systemic rather than incremental design approach, social or societally oriented design discourses challenge the historical preoccupation of the needs and wants of clients. Often-abstract concepts of markets and demographics are reoriented to prioritize the social and environmental implications of design decisions and outcomes as above or equal to the needs of clients. These new social and sustainable
practice modalities have opened up a new client base and legitimize a project
typology and range of methods previously inaccessible to industrial design
education. Importantly these new modes have enlarged the often-reactive
nature of the discipline as a deliverer of producible commercial artefacts to
clients, to being a practice integral in devising systemic responses to complex
organizational and societal concerns.

These ruptures constitute a fundamental change to the construction of
meanings of industrial design in Australia and highlight the disjuncture
between design practices, theories and pedagogies carried through the
historiographical dimensions of disciplinary development. While the histories
of industrial design speak of a continual negotiation of the disjuncture
of theory and practice, this shift has rendered much of the traditional
and tacit orientations to curriculum, pedagogy and practice of industrial
design ill-equipped to deal critically with this changed and future context
of engagement, where the implication of designing is central to the very
construction of disciplinary meaning. However, the original propositional
and contextually situated tendencies of industrial design contain an implicit
critical agency that present possible ways of contending with change. These
ways include designerly modes of observation, representation, proposition,
conceptualization, and situated inquiry, each directed at application in the
world. These modes, if apprehended though a lens of a critical pedagogy,
provide the possibility of an implication-attuned disciplinary practice that
may in turn transform its institutions, conventions and curricular orthodoxies.
However, in approaching change through the established ways of doing
industrial design, the educator is reminded that the methods of design are
not its content, and that content (ideas and problems) are in part arbitrary,
in so far as they are parametrically assigned. The arbitrariness of the ideas
that design chooses to contend with can be of both benefit and conceit for design. It can drive particular innovations through design, and it can, when the designer sees her practice as converting 'content' into material outcomes, result in a diminution of design as a critical agent in contexts of concern. For the educator, looking for ruptures through positioning formative education within big themes of change carries necessary tensions. In a global context of design, where industrialization and the post-industrial turn are concurrent long-formed notions of practice are potentially left adrift.
6. Towards a Pedagogy of Implication: The Sociotranseunt Practice

This chapter reflects on the fieldwork to build a theoretical proposition for a particular kind of industrial design practice pedagogy. This theory building translates to contemporary theories of transformative design practice within social and sustainable design discourses. These discourses ask for the transformational agency of design to figure a way out of a dilemma of practice: to at once bring positive change to the world through design, and to apprehend the need for design itself to change. On one side the path for change is figured around methodological concerns, and on the other the very ways of being for design produce the need for transformation. A double bind, such a path is difficult to reconcile. The theory of the practice described in this chapter operates as a socially activated and transitive practice that passes through this causal loop - a Sociotranseunt Practice of design. At the level of theory it offers a mediating breach between the methodological and ontological in the actor network of the theorising of design for change. At the level of application this practice sees the industrial designer enter into a particular context to intervene through the design of new things and systems that cross between implications and actors to produce transformed sociotechnical practices. In reflecting on the affordances of the models put forward through the fieldwork the chapter focuses on the centrality of my pedagogic ‘approaches’ in the constructing of notions of ‘concern’. These concepts act as key driver of changing meanings of design through the proposition of Sociotranseunt Practice. The salient elements of Sociotranseunt Practice are expanded and discussed in relation to a transformative framework of design practice pedagogy. This framework is an ecosystem, or actor network,
into which design activities and outputs mediate implications. Described through a model these elements are conveyed in relation to instances of teaching undertaken in the fieldwork toward a Pedagogy of Implication.

What emerges from reflecting on the fieldwork is that the very context of the getting of practice - the studio or the workshop, or the studio project narrative - designs designers. In part determined by the institutional parameters of education, how they are conveyed through design project learning resides in the domain of the educator. Pedagogy in this way sets in train a scripting of the being of, and the ways to, design that may or may not be made effective if disciplinary transformations towards new meanings for practice are not continuously attended to through theorising. Theory for critical and transformative practice delivers into design discourse concepts of how design practice (and by extension design pedagogy) might let go of professional delineations and adopt more universal and transferable modes of operation. Many of these new modes have emerged through concerns of sustainability and the transformative agency that design has, or might appear to have. However, this theory as it forms in the university, or historically in the design school, can be seen as operating in two primary zones of meaning construction: the methodological and the ontological. The two are uneasily reconciled in practice as they often presume a singularity of transformative motivation and method that is in isolation from an actual site of practice. Many of these theories for practice, and indeed many contemporary discourses in design, speak of a departure from notions of disciplinarily bounded practice as some form of solution, but are often written from the an a priori disciplinary frame. From a practice perspective this stripping away of difference presumes that design as a verb without an object can function just the same. When the object of design is to transform, or to lead to more sustainable outcomes then
the subject of design – the thing or system and its context and use requires specificity. Such specificity might be solved in inter or multidisciplinary ways, but these ways still demand the prior habitation of a discipline to be able to multiply or move from.

The methodological domain of design theory focuses on the conduct of design towards specific ideals of practice. This concerns the processes of designing and has, particularly in the past two decades, produced a plethora of ways by which design activity might be undertaken. Alistair Faud-Luke’s (2009) proposition of Design Activism stands as one example that sets out a practical path towards an idealised imagining of how design might come to see itself in the world through changed ways of designing. Provocations for change such as this gradually form as discourses and sub-discourses for design, such as Inclusive Design as a branch of User-centred design, or Product Service Systems design as a sub-set of Design for Sustainability. These discourses typically comprise of an articulated position of concern for design such as a concern for new and more sustainable society. In the fieldwork the Diabetes Studio projects centred on notions of concerns of condition management as distinct from the concerns of the medical. Methodologically defined discourses develop their own communities of practice that through their activities contribute back to, or transmute the discourse. Often these discourses are premised through an argument of the need for methodological corrections to the ways in which conventional design practice is done, and offer a series of steps by which an ideal position might be achieved through design.

These discourses for design, while locating new ways to do design, and new, or more defined, directions for design, tend in education to maintain overarching meanings. Meanings of the being of a designer in the world are both prefigured and figured by education, and transformational discourses
are no different. However, often the prospect of the ‘transformed practice’ is pointed back into the very contexts of practice produce the need for transformation. Theory exploring this dimension can be seen as concerned with the ontological precepts and the possibilities for the transformation of design through designing and being designed upon (Willis. 2006 & 2007). Ontological approaches to a theorising of design look at the agency of the designed thing or system and how those elements, as objects, tools or services script human practices, and by extension the actions and meanings of practice for designers. When the being of design is brought into focus for the purposes of disciplinary transformation or adaptation to changing concerns, new terminologies and alternative or prototypical propositions for design arise. In the sustainability field the inter-contingencies of material and technological things in the social and ecological worlds lead to questions of production, consumption and the labour of people. This in turn leads to questions of the orientation of designing as itself a consumptive-productive labour that proliferates other forms of consumptive-productive labour back into the world.

When applied to questions of sustainability ontological approaches highlight the failures, or the limits of discourse and method in design to fully recognise that its un-sustainability is linked to a proclivity to continuously design anew. Such theory points to pedagogy where in learning to design from precepts, conscious or not, renders designing a process that produces deep habits of un-sustainability. Tony Fry (2009) proposes that this pattern requires an ontological break - a redefinition of the very way design sees itself and the operations (processes and precepts) of design by claiming the need for ‘systemic discontinuity’ (p. 57). Central to his proposition is that the ‘un-sustainable’ is enabled through activities of designing, and that design is unwittingly ‘de-futuring’ and thus requires ‘re-direction’. Redirective Practice,
is for Fry a mode of ontological design, that critically sees the activity of designing and the outcomes of design in the world as an agency. Redirective Practice seeks to transform the world towards notions of 'sustainment' as an alternative state of being from that of sustainability. The role of the designer in adopting a process of redirection can be seen as anticipatory, where the likely de-futuring path is defined on both macro and micro scales, and alternative scenarios of sustainment can be pre-figured by design.

However, while theory in the methodological domain requires an ideal for practice to activate its methods for design, the ontological domain requires methods to enable the transformations to practice that it sees as critical. The methodological, in seeking the replacement of ineffective methods towards the realisation of a transformative ideal, frequently forgets in practice that the subject is the topic and context of design defines the object, and is always and already changing. Consequently designers use methods that are appropriate to their particular contexts of application and are rarely methodologically defined by one field of discourse. Design processes are thus enacted through a methodological bricolage that very often does not correspond to the singularity demanded where the subject and object of design is an ideal. Design in practice is always and already in, for, and of the present and its future. Ideals for eventual transformation must be made visible in the action of the present to ever claim of a transformation. However, this is more than semantic, as where these domains collide is in the space of the pedagogical: where an extant plurality of motivations and methods for design are activated toward meanings of practice that are produced through the being with ways of practice.
6.1 Modelling the Sociotranseunt Practice

My pedagogic practice could be described as teaching as designing, designing as theorizing, or theory making as teaching. It might be any or all of these things, yet it is potentially just a proclivity I have for making teaching a place for a theorising of ideals that sit between the methodological and the ontological. Pedagogic thinking serves as a means of projecting what industrial design as a discipline ought, from my gaze, become. That I invite in of layers of complexity to teach in ways that might otherwise lead to the design of commercially or technologically derived products speaks of these ideals. Notions of a transformational agenda of industrial design practice are signposted throughout my practice, and maintain historical disciplinary inclinations for reform as a central aim of practice. Pedagogy as a site for research becomes in my practice an opening out of ideas of industrial design with my students towards our shared concerns via a mediating of the localised problems of our others. It constitutes a particular form of capacity development, that sees industrial design practice oriented as an ideologically charged form of practical critical citizenry: where industrial design in the university tackles concerns that fall outside of normative practice. My pedagogic practices discussed in the previous chapters serve as a location for a gathering of theory toward this end, where the potential for ruptures to dominant meanings in industrial design are at once grounded and amplified through engagements in the real problems of people.

Through this research I have come to settle on my pedagogy as very particular practice of theory making in action. As a form of critical-sustainable-social-design-pedagogic-theory-practice it is in a constant state of assemblage: negotiating meanings and values of industrial design in education to discover...
opportunities for disciplinary change in practical and situated ways. This forms as a specific practice of design I call Sociotranseunt Practice where design actions pass from the socially constructed and contextually situated ‘mind’ of design in action and into physical or technological acts. These actions and their transformational agendas become apparent through their effects as things and systems in specific contexts and concerns. Emerging through my engagements within complex learning and teaching scenarios that define design by its transformative potential, the Sociotranseunt is a particular type of industrial design practice. Transitive, it is at once pedagogical and practical, and takes design beyond its normative boundaries to attempt to bring effects into the real concerns of people.

While exhibiting, or enabling, all the things that might be visible inside normal industrial design practice, this form of operating positions its value in other ways; not on the solution of a problem or the realisation of an artefact to be a manufactured, but in the manner in which questions and tactics of intervention in a design situation are activated and mediated. It positions industrial design as a socially defined transformative agency that works on problems and draws from a wide toolkit of methods of investigation and intervention. Importantly, Sociotranseunt Practice redefines the way the contexts of work for industrial design are positioned as a driver of particular approaches. Located away from the vocational, where design is commissioned in different ways, design in this modality is positioned as a participant actor within defined contexts of concern. This pulls industrial design away from a focus on the specifics of a product for manufacture (although this might occur), and away from the expressive or aesthetic where the vision of the designer initiates the practice. As a theoretical proposition Sociotranseunt Practice (figure 6.1) instead centres its actions within the notion and context
of ‘implication’ as a means of activating change. It is an open, or more precisely a methodologically agnostic theory of practice, that can be deployed using potentially any design discourse or method that seeks transformative ends. It is an adaptive practice that reassembles itself to the specific nature of an implication under design.

Read from left to right the practice involves the intersection of concerns in the world that form as implications amongst a series of human and non-human actors. These implications then get carried into a sociotechnical practices - actions with things and systems. Framed within a location called a Defined Context of Concern, a local site for design intervention, various actors, including the designer, collectively contend with the particular implications of their sociotechnical practices. Concerns from the world continually enter in from one end and manifest in implication generating practices with things and systems. Implication generating sociotechnical practices could for instance be concerned with issues of consumption, or inclusivity or health, but it is open to any concern that offers opportunities for design to act as a critical transformative agent. When design gets involved it comes in

Figure 6.1. Sociotranscendent Practice.
from the other end of the Defined Context of Concern as a series actions that produce new things and systems, that in turn pass through actors and their practices and make a breach between the implication and the actors. This breach produces new mediating practices that transform the situation.

When at work in a pedagogical sense, Sociotranseunt activities reach out in all manner of directions to find signals to change a disciplinary practice. Such a practice I see as pivotal to mediating the implications of living in ways that are scripted by designed things and systems. My desire for industrial design as a discipline to orient its integrative capabilities toward issues of significance such as questions of sustainability, the effects of macro-economic restructure on the ways people live and work, or the health and wellbeing of peoples pervade my studio constructions. These fields of implication are areas that industrial design ought pay more attention to, and the mechanism that I have at hand to point practice in such a way is my teaching. In this way my practice can be seen as working to realise a design 'pedagogy of implication' through a reconciliation of my own disciplinary and pedagogical values with the tacitly carried legacies of industrial design through education.
6.1.1 Making Meaning in the Mess

Theorising is, within my approach a ‘making’, and as a designer I delight in the exercise of fitting together disparate parts to make a working whole or a system of things. My pedagogy is also a significantly social: pulling in the positions and voices of others. My approach can therefore be seen as a socially negotiated creative practice of thinking, talking and making. Yet it is also equally introspective and reflective which forms as a recursive journey of thinking through my thinking through. Pedagogy as ‘making’ is however not about the perfecting or optimising of how I might engage in teaching, but about the negotiation. In the ‘thinking through’ I derive value from the transitive nature of my work regardless of how functional or dysfunctional the outcomes. As a form of reflective practice I rely heavily on the generation of models, both mental and procedural, to comprehend my disciplinary inclinations and to build ways for them to be opened up with students. However, models being models are in my practice useful, but ultimately only ephemeral things. They come and go, are drawn and redrawn and accompany thinking for the improvement of my practice. My models are transeunt objects that pass out from the mind and into the world to take effect through teaching as an emanant act. I make models to push a concept, to test its durability, to reveal embedded tensions and ultimately, to reflect through the production of new models.
In reflecting on the models devised and deployed through the case studies, I found only aspects from each that might lead towards a full theory of my practice. I had set out to define a pedagogy that accounts for the concerns of learning, designing, and the translation of design into the lives of people. Yet moves towards a 'pedagogy of implication' were only partially revealed through elements of each. The agency of design that I had implicitly privileged in the action of practice was itself suppressed by the process of giving narrative to an implication. Thus, tensions of the durability and transferability of each model emerged. Evident in my practice, but not adequately carried in the initial models, were the ways in which industrial design practice was working both as, and with, the intermediary and mediating effects of designed things as critical actors to change a situation. Intermediaries in a Latourian way maintain an Actor Network or sociotechnical situation, where as Mediators offer openings for alteration. Intermediary and Mediating actors transport and translate meanings between each other and phase change to become one or the other (Latour, 2005). The task for design, as a transformative discourse within an Actor Network is one of amplifying the mediatory to induce transformations. This orientation became a key to the development of Sociotransient Practice and the building of a theoretical model to fully convey my pedagogy.
6.1.2 Staging from Models

The setting up, or staging of a design situation to activate students to then learn design through design requires certain artfulness. As a studio is both a place for simulating disciplinary practice and for the negotiation of emerging modalities of practice, the moment of commencement for the learner is as important as the support they receive along the way. Typically students first encounter the laying out of the purpose of a project through an explication of the context and method of approach via some form of briefing. At this moment the motivations of students, and the capacities of the educator, become patently visible.

Central to the fieldwork was the question of how I go about staging a design studio towards notions of the implication, and how the implications of, and for design practice might lead to the development of new meanings for practice. I developed a series of tactics (models) that were deployed in the field. To test these ideas I reflected on the inter-relationships between the Scales of Implication Model (SIM), the Ficto-Authentic Typology (FAT) and the Knot model for their affordances on five key fronts. The first pertained to how the models changed or generated new notions of practice. In design projects, where the activities of designing and designed things are positioned as critical actors in the transformation of a situation, this affordance to new or changed meanings of practice appeared pivotal. The second question of the models was to how, through their collective ability to locate both the design student and the educator as critical stakeholders in the construction of disciplinary meanings, they provided adequate pathways towards a reflexive disposition. The third category of reflection was how the various actors at work in a design studio scenario could be productively aligned to enable rich
learning experiences. The fourth related to the ways in which the models set up a relationship that industrial design practice has, or ought have, to the lived concerns of others, and how such a relationship was able to be elevated, or expressed, through the models as a mechanism for framing a design studio. Finally, the models were considered for their ability to fit theory with practice in robust ways so that the approach might be durable and transferable.

The SIM and Knot model in particular each provided openings for reflection in action, allowing students to think through what was happening in learning relative to the particularities of the project that might be working on. When used in concert, these models produced a robust narrative and structure for a design studio project and a plan for the temporal flow of the project. This approach ensured that adequate pathways for capability development for students within disciplinary encounters. Through a project narrative and the scripting of a considered learning experience, the construction of projects via the FAT and SIM models involved the aligning of various actors. This I found required quite intensive focus in some projects, and while generally effective, this level of alignment limited the transferability of the approach. Similarly, projects that dealt with a prescient and shared concern amongst learners afforded the generation of a compelling narrative in ways that other projects, due to the topic foci simply couldn’t. The transferability of the models hinged on my capacity to bring students into something that they saw, or were rapidly brought around to seeing, as important to confront. This demanded a close eye on the social discourses of concern that surround students and the privileging of notions of topicality in studio constructions.

In my process of building each instance of teaching practice into a complex but creative affair I used the models to think through of the staging and approach to a studio. The models as mental tools generated project narratives
that enabled a means of fitting theory with practice. However, as theory is not always included in the picture of industrial design practice that many students enter university with, their transferability beyond my particular teaching styles was not really reliable. Students at the undergraduate level are understandably concerned with the practical and professional application of their learning and the abstractions of theory may have been for some an imposition on their prefigured expectations of learning. To contend with this I developed strategies of treating theory in a light way, as if a puzzle that is gradually opened out through the conversations that surround designing.

Which model ought take primacy in a project remained an on going question in the fieldwork. Indeed the very question of for whom such an approach to pedagogy was serving, my own or my students, lurked in the background throughout the fieldwork, and remains a point of creative tension. For instance while the SIM and FAT began to generate a particular type of pedagogic creative practice requiring the artful scripting of a project, in the action of a project this risked a dislocation from the needs of students. Consequently the process of learning and design explained through the Knot Model dominated my engagements with students in some of the projects. As a procedural model the Knot, once explained, provided a path through a project and, at least from my perspective as a teacher, a degree of certainty for students. On occasions this path, and its milestones, would render the initial narrative construction of the studio obsolete, where the opening out of the process provided space for alternative discourses and methods of practice to intercede. However, the converse also happened, where the project set up with its various external actors and theoretical landscape set up through the SIM would lead students into ways of practicing that could not have been anticipated through the Knot model. For example in the Live design studios
undertaken in the health and sustainability arenas, my sequencing of the projects in an open, but otherwise conventional structure of industrial design projects that the Knot model laid out was not always adequate and required the generation of context specific project sequences that worked with the various actors.

Other tensions in my approach similarly emerged and my use of the three models lead towards a mode of studio construction and conduct that revolved around trying to reconcile notions of assemblage and the dimensions of an implication. That I was approaching method and discourse in industrial design as a practice of pedagogic assemblage sat as no surprise. Industrial design education, indeed industrial design as a discipline is in a perpetual process of assembling and reassembling its ways as discussed in chapters one and two. As a diversity of methods and discourses sit within my approaches to teaching they function as a repertoire to mediate a particular scenario for design. In instances of shared teaching in particular, my proclivity for broad assemblages of processes and theory risked unwieldiness, and yet my practice courts the unwieldy. In negotiating theory within the practical activities of design with students I began to operate with theory in ways not dissimilar to the ways I might draw with a student as a means of opening out a set of ideas or opportunities through a social activation of theorizing. With this my particular approach to curricula, or project design, as a creative assemblage began speaking to something other than a delineated discourse of practice.

These tensions and transgressions became starkest in studios that sought to elevate the implication of designing as central to the pedagogic preparation of a narrative for practice and those that located the design student as a stakeholder in the situation. This dimension stands as significant, as while I was thinking through the staging of education via studio projects the
implications or concerns that the studios were opening up for students very often had their own logic of approach. In allowing the construction of studios a means of wandering into indeterminate problems within stakeholder contexts that have multiple needs from design the models risked an aestheticizing of the problem or implication under design. Within speculative projects that had a fictional dimension this was of no immediate concern. However in live and propositional project constructions it produced a liminal scenario where the progression of the studio as responsive to the needs of stakeholders, and not to the studio construction, needed to be constantly kept in check.
6.1.3 A Model to Activate
Sociotranseunt Practice

To reconcile these tensions I returned to a process of making mental models - my practice of thinking through a process of diagramming. My approach to projects that deal with live scenarios and real world concerns comprises of a series of inter-contingent components. In the abstract these components operate as an ecosystem of interactions between the transitions of a set of concerns towards an articulated implication. Within this ecosystem the navigation of implications by actors is done via their sociotechnical practices. This ecosystem forms as an expanded model of Sociotranseunt Practice and shows the process, and therefore the Pedagogy of Implication. The Sociotranseunt Practice-Pedagogy System model (Figure 6.2) constitutes the diagrammatic explication of my theory of practice. It positions design practice, and therefore pedagogy, as a process of mediating implications through the provision of designed things and systems that disrupt, or rupture, the progression of an implication. In this way it aims to alter a sociotechnical system and its network of actors. It draws in aspects of Cultural Historical Activity Theory and Actor-Network Theory to focus design activity on outcomes that change the course of a practice within a Defined Context of Concern (DDC). These transformational outcomes are activated by the uptake of new sociotechnical practices and constitute a type of breach that passes over a gathering implication, and the manifestations of that implication in people’s practices with technical and material actors.
The interactions between elements in the The Sociotranseunt Practice-Pedagogy System (SP-PS) model are mediated by design actions to form a generalizable sequence toward a transformation of the concern. Once an implication is framed for design action it is reconstructed as a narrative. For the educator the narrative construction entails the locating of the project within the particular context of application and the setting up of pivotal actors for...
linking the learning project to the implication. These actors include clients, communities and various experts in the problem space, and each provides the project a degree of grounding. As all human actors (including designers or students) in the system are naturally inclined towards intermediary action to maintain their position in the network, each works to tacitly maintain their own interests. Within this network design activity is useful in mediating the concern, while at the same time ensuring that activities are meaningful for the designer’s own notions of design. The context of application could be within a specific community or industry setting, the home or workplace, or within the particular practices that stakeholders might enact that are relevant to the implication. What is critical to Sociotranseunt Practice is that it is located in the real and in the present, and is, in its current construction, a practice that cannot be fully engaged in the realms of the hypothetical or the far-flung future.

In the domain of the ‘concerns of practice’ the construction of the approach involves the selection of a set of appropriate methods for investigation and for design intervention. Methods of investigation could include various ethno-methodologies, desk research, or other forms of gathering up data on how the implication manifests within the context of application. In some way this resembles a process of general diagnosis, where, in the absence of a precisely know problem the system of human and non-human actors that are visible in the situation display particular modes of interaction that can be looked on as symptoms. Methods of intervention are the means by which design activity is used to both inquire into the context of application and to incrementally open it up to be amenable to more intensive design actions. Combined these methodological elements, when activated, afford the building of new notions of disciplinary practice.
The process of framing an implication for design inside the SP-PS involves the connecting together of a series aspects of the ecosystem to convey the plausible implications of a current circumstance. Described as ‘concerns’ these elements are, in the abstract, combinations of the lived problems of people, production, and place. These operate in relation to how issues emerging from societal, economic, ecological, political, historical, the technological and material, as predictable, or default concerns, collectively play into the generation and mediation of notions of implication. In conveying this for the purposes of teaching the methodological concerns of practice, the context of application, and its actors are related through a complex layering that marks out a need for design action. This narrative could form as a project through a discussion, or through an immersion within the context of application. As the SP-PS can be used for working on mundane issues, just as it can on intractable concerns, the narrative of implication may need to be significantly dramatized so that design action can be activated. The phases of design action in the SP-PS are replicated across both the mode of design practice it initiates, and its pedagogic deployment.
Concerns constitute meta-level problems that manifest in the affairs of people, production and place through their interactions with material and technological (designed) things and systems. The Sociotranseunt Practice-Pedagogy System denotes a series of default concerns, but they are unfixed, and other concerns, or more specific concerns, can be swapped into the model as appropriate for a particular context. However, as a context of application is invariably a complex system of sociotechnical practices enacted through multiple interactions between human and non-human actors, it is likely that most projects would include combinations of competing concerns. For instance, in the sustainability oriented projects discussed in the case studies environmental issues constitute just one aspect, or actor, of the theoretical, methodological and practical landscape needed to respond to a design problem. While often dominating the engagement, projects in this area are subject to other affordances being delivered through design. This could include the aesthetic or experiential dimensions of a product of service (a thing or a system), or the activation of social and economic moves within the design of a product service system or an article for collaborative consumption.

6.2 The Defined Context of Concern

Concerns constitute meta-level problems that manifest in the affairs of people, production and place through their interactions with material and technological (designed) things and systems. The Sociotranseunt Practice-Pedagogy System denotes a series of default concerns, but they are unfixed, and other concerns, or more specific concerns, can be swapped into the model as appropriate for a particular context. However, as a context of application is invariably a complex system of sociotechnical practices enacted through multiple interactions between human and non-human actors, it is likely that most projects would include combinations of competing concerns. For instance, in the sustainability oriented projects discussed in the case studies environmental issues constitute just one aspect, or actor, of the theoretical, methodological and practical landscape needed to respond to a design problem. While often dominating the engagement, projects in this area are subject to other affordances being delivered through design. This could include the aesthetic or experiential dimensions of a product of service (a thing or a system), or the activation of social and economic moves within the design of a product service system or an article for collaborative consumption.
The default concerns shown in the SP-PS model are largely macro level and include the:

- Politics of a situation, which speaks to issues of power, of rules and of the moralities at play in a situation.
- Economics of a situation that denote issues of exchange and labour.
- Technological and Material concerns denote issues of things and systems.
- Historical concerns that make manifest issues of change and legacy.
- Ecological concerns pertain to impacts of notions of, and the actual conditions of place.
- Societal concerns deal with the nature of relationships, issues of care, of justice, or of difference.
6.2.1 Implications

Implications within the Sociotranseunt Practice-Pedagogy System are assemblages of real and future concerns that might be mediated through designed things and systems. Concerns manifest in different ways and can form a hierarchy of implication, where in any situation, and from the position of any particular actor, one implication may take primacy over another. Implications are broad or enveloping concepts that typically have multiple dimensions, many competing meanings, and numerous fields of expertise present within them. Implications are deliberately indeterminate and include, but are not constrained to, questions of: sustainability, health, poverty, education, exploitation, management or aging. The model deliberately omits such categories in its graphical representation, as within the SP-PS the assumed driver of a problem may in fact not be the problem, which can lead design into methodological selections that are inappropriate or might be misdirected. For instance, within a question of health as discovered through the diabetes studio projects the medical position often dominates an individual’s and communities sense of the nature of their concern. Yet in confronting the problem through designed things and systems it became evident that the issues facing the community of concern were problems of management that could be mediated by new tools and systems. If this was approached from a medical product design perspective for example, issues of self-management may not have been seen and the outcomes might have led to variations on existing medicalised practices rather than the design of mediating things that transformed the nature of the perceived problem.
Implications manifest for design in the nature of peoples material and technological practices within specific contexts of concern. Any implication will have multiple contexts of concern, each with numerous communities of human and non-human actors that move between other contexts and communities. However, once an implication as emerged or erupted within a sociotechnical practice it gets transported as a problem within a Defined Context of Concern: an incidence where a design activity, such as the design of a new thing or system might act as a mediator and alter for the better the particular situation. Implications, as the collected concerns of people, production and place get carried through the SP-PS and the porous body of the DCC and into various Human and Non-Human Actors. In this way the DCC can be thought of as an upturned and split variant of Lave and Wenger’s (1991) theory of Communities of Practice and legitimate peripheral participation in two main ways. The first is that a DCC can be a significantly localised site of action. When local it forms as a Community of Practice, where human actors do not necessarily share the same objectives but participate with each other through non-human actors towards some end that makes manifest an implication. The second is that while a DDC is localised, the routines of practice that exist are very often generalizable. As such, an implication, its sociotechnical practices, and the designed things and systems that might mediate it are likely to be replicated in other contexts of similar concern and can thus be translated.
Within a DCC implications are assembled and conveyed through narrative processes similar to those described in the Scales of Implication Model. This is done across three levels: the micro, the macro and the meta. At the micro level concerns are associated directly to activities of design, the development of specific capabilities, and the application of techniques that might be useful in negotiating the project. These capabilities are iteratively developed through an immersion into the specificities of a particular design problem within in a DCC. Macro level narratives focus on the designed thing, service or system and how it ought operate within the DCC. At this level the negotiation is largely methodological and pivots on how, and what, design approaches might best direct or inform particular ways of mediating the implication under design. The meta level deals with the enlarged implication, or the scaling up of an implication and its mediation. This invites in questions of the nature of the implication as an intractable problem and what the mediation of it might mean for the actors in the DCC, the discipline and the individual. Negotiations of a concern through the micro, macro and meta levels of an implication in sociotechnical network provide learners a means to test the efficacy of their particular disciplinary capabilities. This forms as a process of on-going reflection on, and articulation of an individual and a groups' navigation of the complexities of a design situation.
6.2.2 Actors in the Design Implication

The people, things and systems that reside in a Defined Context of Concern constitute a network of actors that mediate and translate the meanings and practices of an implication. Operating in the same way as Actor Network Theory (ANT), these actors have no determined or stable hierarchy and the significance of any to the functioning of the community of practices shifts through action in the DCC. Broadly categorised as human and non-human actors, these elements of the system interact continuously through a series of shared rules to either maintain the implication system, or to transform it towards new sociotechnical practices. Interactions between actors in a DDC thus represent the ecosystem of an implication.

6.2.2.1 Human Actors

Within the DCC human actors comprise of those that directly interface with, or inhabit through their practices the implication, and those that participate indirectly. Stakeholders that are directly implicated in the situation under design constitute the dominant actors. These can be thought of as a client or user community, although they may not directly commission design inquiry. Indirect actors pass in and out of the DCC as intermediaries or as mediators. All stakeholders carry their own motivations, expectations and capabilities into the situation, yet not all work on, or make alterations to the state of the implication. In a design studio engagement participants from the design side include: students working independently or in small teams; the teacher that directs and assist students to operate within the DCC; co-teachers that are either equal in the engagement or providing specific design expertise; and actors that provide expertise from outside of design, such as engineering, sociology or business.
Sitting outside of the DCC are numerous peripheral actors that are not necessarily present in the situation but provide inputs in a range of ways. Stakeholders of the profession set out expectations for the development of particular capabilities and dispositions to practice that filters through the educational exchanges and the social discourses of students. Stakeholders from the broader discipline, or from fields of associated research, offer methodological and theoretical concepts for practice that contributes to methods of design action.

6.2.2.2 Non-human Actors

Material, immaterial, technical and institutional elements that elicit human interactions, or that interact with each other, are defined as non-human actors within a context of application. There are several categories of non-human actors each with their own sub-set of material, immaterial and technological things and systems. These include contextually specific actors, interloping actors, and curricula or institutional actors. The precise make up of these categories of actors are subject to difference in any DCC.

Every context consists of locally specific things and systems, each operating in unique ways, and each contingent on the sociotechnical particularities of the situation. Contextually specific actors are central to the normative functioning of the situation and include products, services, technologies and protocols. Operating as a local system of things each brings the other a set of affordances to the ways an implication under design might be mediated through change or maintained. A good example of contextually specific actors is provided through the Diabetes project case study. The simple and frequent process of measurement of Blood Glucose Levels (BGL) constitutes a small network of
objects and systems including; a lancet pen, blood, test strips, a BGL reader, a diary for recording results, and a carry case. These elements require a correct sequence of interaction for them to work, that through the common process of use by other human actors in the context of concern, form as a defined sociotechnical practice. When one component of the network breaks or is lost it transforms from being an intermediary actor to a mediating actor in that it disrupts the network and produces various implications.

Interloping actors enter into a context of concern from outside of its normative functioning and can be transformative or migratory. Transformative interlopers are material or technical disruptions that highlight or give rise to an implication to form a DCC. These can be though of as Mediating Actors in that they offer the greatest potential for transformation of the DDC. Migratory interlopers are intermediaries and enter into a context in an ephemeral, and even banal way, causing minor alterations to the operation of the situation. Migratory interloping actors either move out of the remit of implication, or their effect dissipates through the system via a normalising or adapting of the DDC around their marginal impact. In the diabetes context a transformative interloping actor could be a smart phone and software application that ports data directly from the BGL reader and automatically logs it thus removing a series of practices in the DCC, and potentially producing a raft of new sociotechnical practices.

Curricula and institutional actors include all of the instruments, protocols and governance mechanisms that accompany a student and teacher in their approaches to learning. Pedagogic strategies including forms of transmission, briefing, moments of instruction or discussion, and while mainly immaterial all constitute non-human actors. Mechanisms of learning and teaching governance including: the over arching curriculum and the learning outcomes
specific to the particular stage or course a student might be engaged in; the duration of the project engagement; and, methods of feedback and assessment. Resource based actors include sites for specific forms of work such as, the fabrication workshop, and the tools and equipment used in a process of design. Knowledge based resources include capabilities acquired through other courses that a student has done or is undertaken concurrently, libraries, and platforms for research and communications between students and stakeholders.

6.2.3 Sociotechnical Practices and Contending with an Implication

When contending with an implication inside the The Sociotranseunt Practice-Pedagogy System, each of its surrounding concerns are considered for their particular affordances. As an implication is maintained, or carried by a designed thing or system into sociotechnical practices, new things and systems that enter the DDC can alter the likely course, or understandings of the implication. Sociotechnical practices are simply the things people do with, and through, things and systems. When these interactions are routine the actors interacting can be considered intermediary. This constitutes their normal, or preferred operation that sees the network of actors engaged in an important process of maintaining a sociotechnical practice. However, when one or more actors cease to function in predictable ways the DCC becomes unstable. This produces fragility in the normative workings of the network that then requires revision or replacement with new practices. These types of interactions constitute the sociotechnical practices, that for industrial design become most interesting, as they are the points into which potential mediation or innovation might be ported.
However, while fragile, sociotechnical practices have inbuilt mechanisms to maintain their own stability. To give a rather mundane example at the micro scale, the practice of having a cup of coffee is contingent of the sociotechnical practice of coffee making. This relies on a complex system of actors. To avoid the disruption to the valued practice (having a cup of coffee), the DDC as an Actor-Network builds in its own internal redundancies through material and technological duplications. This redundancy reduces the risk of a normally intermediary actor (like a cup) not functioning in the way that it should to maintain the sociotechnical practice. Disruptions to this notion of redundancy, regardless of how banal, such as the only cup available breaking, converts the broken cup into a mediator that transforms the situation. This is what gives Sociotranseruant Practice its particular agency in the sustainability domain, where new mediator things designed for the context can both change practices, and can radically dematerialise the DDC. In this way the theory realises many of the aims of the broader Design for Sustainability field but has the option of drawing on methods of design from other discourses to achieve transformative ends.

Implications necessarily generate problems for design and form as a complex and scalable network of actors and drivers. They can be directed towards small or localised micro concerns, or they can be directed towards macro level and systemic concerns. At either scale the role of design is not to produce a hierarchy of implication, but to see the context of application as uniquely deserving of design investigation and design intervention. In large scale DCC’s implications for design are distinct from notions of indeterminate or wicked problems of Rittel and Webber (1984) in that they are not framed as a problem that can be solved, reframed, or even approached as if they
might be. Rather they are positioned as intractable. The role of design within an intractable area is simply to work at the problem, alongside other fields, in order to contribute to the mediation of the concern in small ways, and as a first step in opening out new territories for design to bring improvements to.

6.2.4 Design Actions: Methods of Investigation and Intervention

Once an implication has been framed within and Defined Context of Concern and design students or practitioners have entered into it, a range of processes that are appropriate to the particular situation unfold. Occurring through two modalities, but invariably overlapping, these processes involve methods of investigation and methods of intervention. The sequencing of activities in the design action phases follows those outlined in the Knot model leaving multiple openings for reflection in action.

In centring on a notion of the implication the model quite consciously propels industrial design into extra-disciplinary domains where methods of investigation and intervention are drawn from within design but also from the outside – from other fields of practice. For instance the case studies involved methods of inquiry from: Design; Science and Technology Studies; History; Environmental Science; Mechanical and Manufacturing Engineering; Art; Planning; Education; and, from specific fields of Social Science such as Participatory Rural Appraisal. Primarily these methods of investigation concern the building of a detailed picture of the situation in order to see opportunities for transformation. The sociotechnical practices within the DCC are examined using a combination of methods alongside a variation of Cultural Historical Activity that focuses in on the activity relationships of actors. This
includes looking at the Tools (Things and Systems), Rules (protocols and processes), and Roles (divisions of labour) (Vygotsky.1978), (Engeström. 2009). A portmanteau Sociotranseunt Practice has a few key actions that themselves require new words, or alternative definitions (appendix. 10) of existing words.

Once a particular and appropriate mix of methods, key objectives, and the specific nature of the engagement is determined design action follows. When immersed in the DCC learners, operating as designers, rapidly produce a mental picture of what the design response that might mediate the situation might be (figure 6.3). Forming as a prototypical solution, or projected intervention, this process is the first step in realising sociotranseunacy. The initial 'picture' that is drawn out of a DDC is then adapted and adjusted in the mixed methods research phase through combinations of design thinking, examining relevant precedents, and the gathering of data on the nature of actor relations through various ethno-methodological processes. Translating the prototypical picture of a mediating response can be seen as a form of design intervention. This involves objectifying the situation through the design of things and systems towards the generation of new practices. New practices, as intermediaries, alter the context of concern once they are activated in the DCC. Methods of intervention begin to resemble normative industrial design practice, yet they are directed only into the DCC, and design activities are progressed through a sequence determined by the needs and conditions of the DCC.
Figure 6.3. Students working through opportunities for mediation.
6.3 As if a Machine

This chapter builds a theory of my practice as an industrial designer and as a design educator. In reflecting on my approaches to teaching industrial design there was a realisation that I was in effect replacing, or augmenting normative modes of design education practice towards the formation of “a pedagogy of implication”. As such, questions of the role of industrial design in the making of consumptive-productive labour cycles and their impacts within our collective socio-material constructs hang throughout my practice. Yet, in my own reconciling of this inclination, my motivations and approaches occupied an in-between space in the landscape of design theory towards critical transformation. Caught in the present between the methodological and ontological, the practical and the pedagogical, my approaches form as a critical-sustainable-social-design-pedagogic-theory-practice: an active assemblage of others. In a context of practice that is at once of the historical and for the future, my dilemma itself became the theory and the method.

In looking back at the particularities of my work, and trying to focus in on the defining parts that lead it forward, the fieldwork described in chapters three, four and five was examined for its capacity to bring about a codified pedagogy of implication. My practice is significantly spread, crossing out from design and into history, sociology, education and sustainability and back, collecting up bits as I go and depositing them into the assemblage of my pedagogy. What emerges from this negotiation, of what I do and what it means, is a proposition for a new way of industrial design practice – a Sociotranseunt Practice - that is both actively assembled from the outside, and seeking its own re-assembly within its engagements towards bringing change. The theoretical construction of Sociotranseunt Practice described throughout this chapter
is at once of the practice, and pedagogical, and consistently focused on the transformative potential of industrial design. The components of this theory (as if a machine) and their interactions are described within the context of an educational deployment and offer a particular framework, described through new words. As a theory for practice formed through pedagogic inquiry it carries in multiple traits and inclinations that further embroider its generalizability, and works on implications through mixed methods of inquiry. Sociotranseunt Practice leads to the design of new things and systems that might amplify the mediatory effects of non-human actors in a specific context: a design process that looks to unsettle a situation so as to steer it in directions away from its otherwise implied path. Sociotranseuncy is a socially activated and transformative mode of design that looks to bring change to peoples material and technological practices in ways that are both amenable, sustainable and ultimately generative of better practices. As a pedagogic model it has an ideological dimension that sees design actions valued for their agency in bringing meaningful and contextually defined change towards the social and the sustainable.
This study, drawn out over six chapters provides an account of a particular pedagogy for industrial design in the contemporary Australian context. The research moves through a thick description of the pedagogic inquiry to propose “a pedagogy of implication”. A theorising through and for teaching practice, the textual account of the research is staged in three ways. The background, comprised of two chapters, traces the histories of the development of industrial design as a discipline through education from the mid 19th century until the close of the 20th century. This historical work forms as a discursive literature review that connects together the origins, developments and ruptures of pedagogies in industrial design. A tracing with the aim of setting the scene, and a way to see behind the scenes set: the tacitly acquired and transmitted teaching practices, the institutional dramas that form and frame industrial design.
These histories manifest meanings and tensions in practice that move into the pedagogic inquiry and constitutes the empirical foreground of the research. Opened up through fieldwork done within the act of teaching industrial design at RMIT University, this forms a narrative of changing disciplinary and educational drivers and ideals as experienced in teaching. Crossing three chapters, this aspect of the research includes case studies from the action of teaching explicated through reflections on practice. This grounded and reflective action research works current disciplinary concerns with historical tendencies to articulate a process of, and for, pedagogy in the contemporary Australian context. The case studies are spoken through a series of abstractions of the authors’ pedagogic approaches in the form of diagrammatic models and tools. These abstractions – a theory building – constitute the key figure the research. Abstractions of the pedagogy described make various moves throughout the research and operate as transitive models that move from the mind and then out into the practice. This leads toward the proposition of a pedagogic theory for a Sociotranseunt Practice of industrial design.
7.1 Working Through and Where To Next

Undertaken within the context of my academic work, I entered into the research as a practicing industrial designer. With an academic background in educational policy and management for Vocational and Higher Education my ‘educational’ self dominated the first period of the research. Literature on transformative learning and critical pedagogy entered into the ways I was teaching and transformed my own constructs of design and education. This provided a set of discourses and a field of theory to work from, and while muted in this account of the research, it is present in the language and the thinking. Theory in education opened out fields of socio-material semiotics and systems theory, and I immersed myself back into design theory with a different gaze.

Industrial design in the contemporary Australian context was changing. New ways of working brought on by social, technological and economic change was leading to a realisation in my academic practice of the prescience of Buckminster Fuller’s 1949 prognostication that a “designer is an emerging synthesis of artist, inventor, mechanic, objective economist and evolutionary strategist.” (Turner. 2009, p.150). At once inviting the change, and reading back, I rediscovered the idealism of design and found a thread of argumentation for the kinds of criticality to design practice I was seeing as so important in confronting the coming change. Readings from sustainability, education, from sociology, and from older post-industrial provocations from the likes of Rozack (1968; 1989), Illich (1973; 1974; 1987) and Toffler (1970; 1974) mixed around and shaped my thinking and teaching. And yet change is always in the coming.

The research could be characterised as an assemblage: a fitting together of a disparate set of ideas within teaching. As a hybrid field this research produces
numerous avenues for future scholarship in education, in history, design theory, and for design practice research. Through the journey there comes a realisation that the research is itself all of the practice it attempts to define. A thing it could only ever be, and an opening for further research where the distinctions between teaching, designing, thinking and theorising no longer carry meaning. All together and at once the practice.
7.2 On Design Histories Through and for Practice

The process of undertaking a comprehensive literature review of the development of industrial design as a key driver of the formation of modes of technical and professional education opens up opportunities for further historical analysis. The 19th century development of an education toward the prototypical industrial design in Britain in the late 1830’s, and the small industry schools that informed it, offers the discipline a different lens from which to understand itself. Historical recounting of industrial design often commences in the early Arts and Crafts’ period, and sometime not until the Bauhaus. Both these moments in the development of the discipline had very different drivers from those of the Select Committee and the Board of Trade. As a government intervention for economic prerogatives it pointed design in a very particular direction and aimed it (initially at least) as a critical and strategic discourse. In this way the research perhaps redresses an inadequate, but often told history of the discipline. The very idea of the Industrial Artist or Designer, as a new vocation, and as an economic agent, was key to both political strategies, and social reform agendas throughout the 19th century and well into the last century.

Operating between the aesthetic and utilitarian concerns of material culture, and the parameters of serial and machine production dimensions to the practice are critical to our very understandings of the development of modern societies. Industrial design, propelled through education, was always and already doing much more than outcomes of practice alone might allow us see. The historiographical method that has dominated design history is derived from an art history precept, that in its designer-work-genre-context modality, contributes to this lack of seeing, or telling of the situation. Such a
method risks a misreading of the particular location that industrial design has had as a mediating practice between the wants and needs of material culture, the parameters of production, and the implications that design operates within. While Industrial design as an ‘agent’ has over time shifted from governmentally activated to commercially defined, this ‘agency’ for following through on an agenda for reform remains both in education and in practice.

Under the administration of the British Board of Trade and the Department of Science and Art the model of publically funded technical education, where prototypical industrial designer were deemed 'National Scholars” within the School of Design is itself a site for more focus from fields of design history. As one of the first publicly funded forms of technical education the beginning of industrial design is key to the very development of our contemporary notions of higher education. As an initiative for the further education of working and middle classes Industrial Arts education, be it through the Schools of Design, Schools of Mines, or Mechanics Institutes proliferated. With their development they carried social, aesthetic, and political debates that coloured orientations to practice. Within only a few years the London based Government School of Design was transfigured from an isolated initiative to a new model of mass education that was significantly adapted to the working and middle classes. In Australia and New Zealand in particular this socially attuned, and practical mode of education played, in its own small and unassuming way, a part in the development of a broader universal suffrage movement that fundamentally changed our societies, our politics and our relationships. The impact of this educational and design phenomenon on the nature of the modern city and the development of an articulate and urbane democratic citizenry is profound and is deserving of much greater attention that it has had.
By the last decades of the 19th century hundreds of Schools of Design were set up around the globe. The adaptation of this form of education, and its key methods, to local needs within the North American and Australian contexts is in itself quite extraordinary. Through the network of institutions and a standardised, yet often contested, curriculum, a particular pedagogy for design for the decorative and industrial arts developed. Driving legislative reform this proliferation and the centralisation of curricula control would forever alter the nature of compulsory education and the development of public museums. For educational theory, policy and management the history of the development of industrial design as fully-fledged and global discipline almost entirely through education provides multiple opportunities for further research.

The second chapter explores the intersection of professions of design inside the educational construct in the 20th century. As new technical institutions grew to attend to new processes and technologies used in manufacture, debates of design as a craft, an art and a science progressed meanings of industrial design. Through this, shifts in pedagogic approaches set off a codification and rupture cycle that can still be seen in the discipline. The abstracted notions of form offered by HfG Bauhaus, the commercial orientations to design from the United States, and the methodological contributions from HfG Ulm each, in their own ways, made the very process of the practice. For fields of educational history that focus on the sociology of technology, and technical and arts education the histories of industrial design, particularly from the 20th century methodological contributions from HfG Ulm are quite significant. While examined from fields of sociology, systems theory, methodology and cybernetics the intellectual, industrial, and pedagogic contributions that grew from this small and short-lived design school, and particularly out of its industrial design department, deserve a much greater examination by fields of educational history.
The constant revision of institutions produced tensions of method and meaning that critically informed the development of industrial design education in Australia and the disciplines intellectual landscape throughout the 20th century. Despite this turmoil, the complexity of industrial design education, in its project-based modes, right through the last century is significant for fields of educational research. That industrial design in the educational context has engaged in highly sophisticated, practical and applied forms of higher-order learning for so long but has largely escaped the gaze of educational theory continues to surprise me. A greater focus on its histories and its methods might, in time, attend to this. Closing near the millennium, the second chapter sets the scene for the pedagogic inquiry to follow, where changing institutional, economic, technological, and theoretical concerns pushed the discipline away from the intuitive and the systematic, and into the systemic. How industrial design education, in Australia at least, confronted this transformation in itself warrants further research. Industrial design, like any practice, adapts to its contexts of application, and histories of this adaptation might be useful for other disciplines that go through periods of transformation.

Finally, as archival material from the 19th and 20th centuries gets progressively digitised and made globally accessible to inquiring practice-based researchers, the capacity for many different histories of practice and education open up. For modes of practice-based and reflective research I see this as critically important, as it provides an intellectual landscape into which notions of practice, be they pedagogical or practical, can be located in the broader schema of their fields. To this end the historical component of this research has raised in my practice a realisation that old ideas are very often good ideas, and that theory and method of the present is in the main ephemeral.
7.3 On Teaching as Fieldwork

Through the fieldwork the nature of subjects, themes and topics are opened out in my teaching practice. Curriculum design, as a design process, can – and more broadly should - be a highly creative process, and it has become that in my practice. Students working on complex projects where they can see the joy in, and impact of their, design thinking readily become what any design educator might hope for: adaptive, creative, critical and collaborative. In these areas future explorations will continue to enrich design education, and in time produce new signature pedagogies, curricula structures and modes of learning and teaching.

The pedagogical orthodoxies discussed in chapter three and transmitted through the various historical phases of industrial design education form as a set of near universal signature pedagogies. Functioning so as to orient learners towards the getting of particular practice identities these strategies in effect reproduce a culture of practice. Pedagogy can however be a vehicle for disciplinary change and adaptation to changing contexts of practice where design educators and students can explore alternatives. My focus on the structures and strategies of teaching industrial design provide a critical account of practice as a very particular mode of education. In highlighting the various ways industrial design projects can be constructed the research offers a broad range of approaches to others in fields of design, art and engineering education.

Teaching as a site for research can be positioned as a form of socially negotiated creative practice, and a form of pedagogic bricolage, where the structures and strictures that are inherited through disciplinary modes can be made plastic and mobile. As such, this may afford researchers in other
fields interested in the development of pedagogic traits a means by which to experiment. The use of Cultural-Historical Activity Theory is a good example of this. Quite commonly deployed in educational and organisational theory, adaptations of CHAT provide design a way to hone in on how the products of design activity might maintain or alter social-cultural meanings. Used in teaching as a means of deconstructing and reconstructing subjects, themes, and topics with students, it is a field of theory that I will continue to pursue in teaching and research.

In working to realise a pedagogy of industrial design that directs learners toward modes of practice that bring positive change my proclivity for thinking through diagrams was escalated. Curriculum development through diagramming, my way of the setting of the stage for design activity, became a significant aspect of the research. The development of the notion of ‘the implication’ as an alternative device to ‘the problem’ in design practice provides a way to enlarge the discourse inside industrial design education. This concept is inclusive of the agenda for design, and the development of the learner. The idea of the ‘implication’ projects the designer into the world as a critical agent, knowingly bringing change but doing so in a way that can comprehend socio-technical-environmental-political effect of its outcomes. In a similar way the remapping of the temporal stages of a design project to enable reflexivity in learning design by designing brings with it alternative modes for teaching and project construction. Combined these redefinitions, from within the space of teaching, present a means by which design might be reproduced as a culture of active responsibility.

The research enabled a transformation in the ways I approach both design and education. My teaching became a location for quite an intensive practice of iterative experimentation and constant reflection. Through it I have come
to approach teaching in a way where every course I teach needs to be made memorable for students. I stage exposures to method and theory, and ensure that students extend themselves to build and articulate their own inclinations to practice. Education itself ought always be a place for transformation, and within a university context the need for critically transformative learning is fundamental. As to whether my students are ‘transformed’ is for them to say, however, good teaching should always be so motivated.

A systemic approach to the practice of industrial design in education opens the discipline up to a design concerns that draw in new theory and method as demanded by the particular project. Concerns of design in the health, manufacturing futures and sustainability domain all figure highly in my negotiation of the implications for and of industrial design. These are rich fields for design, and for theory, and present many layers to work through with students. In all of these fields industrial design can, and should, play an important role, and so inscribed into each is an ideological dimension for transformation, for the improvement of the current conditions of our collective system. Yet, for industrial design such ideas are not easily practiced. Pro-sustainability method for design runs into the complexities of existing systems of production, use, value, and exchange, and are too often given over to bringing change in increments. Philosophy in design confronts problems at the other end, in that without the radical redefinition of existing systems into which design operates the path toward transformation is clouded by a continual reification of current ways. Various tactics, culminating in a theory construction towards "a pedagogy of implication", were developed and tested to reconcile this gulf in practice.
7.4 On the Theory Construction

Figured against the theoretical dilemmas of enabling a transformative practice of design the research builds a theoretical proposition for practice in the in the contemporary design condition. Called Sociotranseunt Practice the theory construction is at once of and for practice and pedagogy.

Sociotranseunt Practice reframes industrial design, where design actions pass from the socially constructed and contextually situated ‘mind’ of design and into world through temporal, material and technological acts. Carrying a transformational agenda these ‘acts’ are made evident through their effects in specific contexts of concerns. Industrial design is oriented in this construct as a socially defined transformative agency. As a theoretical proposition it focuses design action on the ‘implication’ to activate and to realise change. A methodologically open practice, it is defined only by its capacity to bring transformative ends: positive change to the real concerns of people, production and place. Reassembling itself to the context and ‘implication’ under design it provides new ways for design to adapt.

This adaptive spirit of the theory returns me back to the endless scalability of Actor-Network Theory and its various ‘afters’ (Law. & Hassard.1999), and to dives early in the research journey into Deleuzian concepts of the rhizome (Deleuze, & Guattari. 2004). In many ways the Actor-Network and rhizome are interchangeable and both are important in reading this research of theory making through and for pedagogy. The rhizome, in its biological sense is grounded – literally; covered, cut off from the light of day and encoded to push its emergent nodes and filaments through soil. Colonizing not by knowing what its destination or aim is, but by having an innate way of developing away from its centre of origin. A ‘way’ that is equally determined by the imperative of
expansion and re-centring, and the contextual conditions in which this growth or change occurs. It has a ‘way’ that concerns itself with its interconnections (as textualities and pluralities) within its context as itself a generative act, rather than being concerned with acts of generation, or a linage of actions. The rhizome has become a synecdoche for a broader post-modern theoretical construct that is inclusive of heterogeneous ways of considering knowledge and knowing. It builds on the humanistic and authentic traditions of existentialism, and particularly the rethinking of ontology as a both a right, and a responsibility, of individuals and societies in comprehending their condition as something that is open to change. While the rhizome provides space for a consideration of phenomena it does not dwell upon, and therefore objectify phenomena, other than to examine the interactions of phenomena so as to discover opportunities through those interconnections. It is this character of the rhizome that accords with the modes of pedagogical inquiry presented in this thesis; Teaching as designing, Designing as theorizing and Theory making as teaching.

Like a rhizome teachers, designers, and theorists contend with their disciplines by pushing their way through gaps in the dark and damp of their practice. Teachers, designers, and theorists are opportunistic – looking for a moment, a clue, a form or a pattern in the messiness of their work that may elicit meaning and provide the conditions for future meaning to be made with and by others. From a pedagogical perspective, Sociotranseunt Practice affords a means of enlarging discourse to find signals to change a disciplinary practice wherever they might be. As it positions the action of design as the key to mediating implications through designed things and systems it offers a path towards a mode of design practice that itself forms a kind of practical and critical citizenry: engaged in the world and cognisant of its futures. In
this way it offers many avenues for further research and refinement through pedagogic application.

An inclination to this practice, or a sociotranseuntivity, leads to design actions that seek to make a transformational, environmental or people centred disposition to design visible in the action of mediation. This ‘inclination’ offers design a way into the intractable, where the pressure of a failure to ‘solve’ is offset by a practice that only seeks mediation. This notion is important for design theory and it will be expanded in future work. Sociotranseunt Practice is an inclusive theory that makes a place for other theories and other methods to be mixed into a process towards a designedly abductive reasoning out of implications. This produces its own rupture for fields of design theory and method, where the reality of practice as a parametrically determined locale, renders methodological boundaries rather meaningless. This isn’t to say that methods from design are not valued, but they are made ready for assembly, to be able to be fitted together in new ways towards mediatory effect.

Sociotranseunt ‘moves’ made toward the positive transformation of an implication are regulated by a socially defined pragmatism within a context of concern. As such the practices of sociotranseunacy alter the very agency of industrial design, where being inside, or alongside as an actor in the context of concern elevates the agency of design as a critical and transformative participant. For fields of critical pedagogy and critical theory this construct may provide useful as through the proposition the act of learning (and teaching) is located within the context of the critical transformation of socio-material conditions, and with it the transformation of the identities and practices of others and of the self.
Sociotranseuncy is neither concerned with being intuitive, nor with being systematic, yet it is always and already a being of both. In this way the theory orients industrial design practice as a systemic concern, and makes its own breach to retain, but augment, the split of process in industrial design that has so marked its development. With this comes change to the locus of design and a redrawing of the contexts of work for industrial design. The Sociotranseunt designer thus inhabits a ready capacity for adaptation and integration within a specific context and community of application. This new location for design similarly alters the very doing of design. Problem solving gets recast as an activity of implication mediation, and design activity gets focused on intervening through material and technological agents in action and within a system of actions. Products and services are reframed as ‘things’ and ‘systems’, thereby elevating, in a context of application, new responsibilities for design. The act of designing becomes a ‘thing-ing’ and a ‘system-ing’ and the designer is visibly, and inextricably, implicated in the mediation of concerns that arise. Once commenced the effects of mediatory actors that make, or alter sociotechnical practices, lead to the elevation of new implications - eliciting new actions toward mediation: and outcome that constitutes the coming of the Sociotranseunt Circularity and the beginnings of a new economy of design for implication.
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### 9. Appendices

Appendix 1. List of Design Studios and Collaborators

<table>
<thead>
<tr>
<th>Year</th>
<th>Studio Title</th>
<th>Notes</th>
<th>Collaborators</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>The Oxen Project</td>
<td>1st Year Design Studio Project</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>Radio Machine</td>
<td>1st Year Design Studio Project</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>Radio Machine</td>
<td>2nd and 3rd Year Design Studio Project (Industrial Design and Landscape Architecture)</td>
<td>Fiona Harrisson, RMIT, Lawrence Harvey, SIAL, RMIT</td>
</tr>
<tr>
<td>2006-2015</td>
<td>Social and Sustainabale Design Final Year Projects</td>
<td>4th Year Design Project Supervision</td>
<td>Soumitri Varadarajan, RMIT, Mick Douglas, RMIT</td>
</tr>
<tr>
<td>2007</td>
<td>This Side of Pinnaroo</td>
<td>2nd and 3rd Year Design Studio Project (Industrial Design and Landscape Architecture)</td>
<td>Fiona Harrisson, RMIT</td>
</tr>
<tr>
<td>2007-2009</td>
<td>Ubiquitous Ingenious</td>
<td>1st and 2nd Year Design History Projects</td>
<td>Museums Victoria</td>
</tr>
<tr>
<td>2008</td>
<td>Transfer Studio</td>
<td>2nd and 3rd Year Design Studio Project</td>
<td>Gujarat Innovation Augmentation Network, India National Innovation</td>
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<td>2009</td>
<td>Quick Fix</td>
<td>2nd and 3rd Year Design Studio Project</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>No Fixed Address</td>
<td>2nd and 3rd Year Design Studio Project (Industrial Design and Interior Design)</td>
<td>Lynda Roberts, RMIT, The Social Studio</td>
</tr>
<tr>
<td>2014</td>
<td>Cycle Futures</td>
<td>2nd and 3rd Year Design Studio Project</td>
<td>Scott Mayson, RMIT</td>
</tr>
</tbody>
</table>
Appendix. 2. List of Papers and Articles from the Research


Appendix 3. Ubiquitous Ingenious Course Outline
RMIT Industrial Design / Design Studies Semester Two 2008
GRAP 1042 & GRAP 1044 / Credit Points: 12
When: 9.30am-12.30pm Fridays
Where: 87/5/03
Duration: 12 weeks face to face / 36 hours total contact time
Non-contact time requirement: 80 + hours over 13 weeks
Coordinator / Lecturer: Liam Fanneney
Email:

Ubiquitous Ingenious: Historical case studies of domestic technologies

1. ABOUT THE AREA OF STUDY

'Ubiquitous Ingenious' looks into the origins and impacts of designed artefacts that have quickly shaped how we live and work and how we understand our cultural practices. This tutorial introduces students to the ways in which historical narratives are constructed, the sociology of objects, the role of museums and the power of history as a mechanism for rethinking and redesigning our futures. There is a focus on Australian histories of design, which will be supported by visits to Museums Victoria's Science and Technology Collection and Archive. Students will collectively and independently investigate and produce a series of historical case studies in a variety of mediums. There will be an emphasis on ways of doing history for the purposes of design, writing and positioning the influence of inventions and design in the philosophical, social, environmental, economic and political frame.

Each student will do three historical case studies that will be compiled into two books and an exhibition.

For more on an insight into the type of learning you will be doing visit the Ubiquitous Ingenious Blog: http://ubiquitousingenious.blogspot.com/

2. KEY LEARNING OUTCOMES

Students will build capabilities in: academic writing, research, constructing and communicating understandings from disparate sources. Students will develop ways of using history as a means of generating ideas for design, theorising and appreciation of cultural materials.

3. ASSESSMENT TASKS

There are three individual tasks and a series of collective activities that need to be done to complete the course. (See Handbook for assessment policy)

Individual Tasks

Task One: "Ubiquitous"

This project requires you to apply methods learned in tutorials to research, write and present a historical narrative that tells a story about the social significance of an artefact in your family. You will need to interview parents, grandparents, uncles and aunts etc. to find an object that carries significant memories of how everyday life is / was lived and construct a detailed story about the relationship that that artefact has had in your family. You will need to take and find photos, dig through sheds and cupboards and uncover the meanings that that object carries.

Look for objects that have a designated use — even if that use has changed over the years. You will need to research its origins, how and why it has been used, and why it is significant.

1500 words with photos in format prescribed.
DUE: 20 August (in class for Peer Review)
20% of overall grading

Task Two: "An Idea of Home: An Illustrated History of Domestic Technologies"

This project requires you to chart the evolution of a domestic activity and its social and technological iterations in the form of a comic. You will be provided with a list of archetype objects and will choose one to tell the full story of its development over the past 150+ years.

The comic will be black and white and will communicate the pivotal moments, challenges and changes in the social life of the artefact / archetype.

These 'histories' can be written from particular perspectives and will focus on the construction of narratives and scenarios and will be compiled into a book at the end of the semester.

61 frames in format prescribed.
DUE: 12 September (in class for peer review)
20% of overall grading

Task Three: "Ingenious"

422
This project requires you to find an undocumented artefact in Museums Victoria Howland Annex and research and prepare a statement of significance as a case study of Australian domestic technologies. The artefact needs to be something that you see as being 'ingenious' in the ways in which it has impacted the way people have lived and worked, and how it has influenced the development of new technologies and designs. You will need to work from the artefact 'out' to build a detailed understanding of the context in which it was active to include the political, social, economic, and technological. This will need to be done to academic standards with correct referencing and attribution of images, text and ideas.

1500 words with photos in format prescribed.
ZGR: 10 October (in class)
30 % of overall grading

Collective Activities

1. Building a Library:
As the course progresses new areas will emerge and be discussed. Each week a student will be asked to source, read and supply copies of a text that will be useful to the tutorial group. You will be given reading each session and will be asked to discuss it and to integrate ideas from these texts into your own work.

2. Designing Two Books:
The case studies will be put together to make two books, one called 'Ubiquitous Ingenious' and the other 'An Idea of Home: An Illustrated History of Domestic Technologies'. Two teams of students will need to design templates, proof read and edit case studies, scan and lay out the contents, and assemble the book digitally and in printed form. This will require reading and editing case studies by students from the same course in semester one.

3. Designing an Exhibition:
The case studies will need to be categorized, edited and re-constructed into Posters for an exhibition. This will require designing templates, editing images, placing artwork and text, and preparing for and carrying out printing, mounting and display.

4. Peer Review:
All tutorial participants will be required to do peer appraisals of the case studies. Here you will have to read and make recommendations to peers regarding the demonstration of their learning through submissions.

20 % of overall grading
4. RESOURCES
Each week you will be given readings in class and you will be asked to source and contribute at least one reading for all the people in the tutorial that pertains to specific aspects of the course content.

The EMT Library has a special guide to resources concerning design history:
http://www.lib.unimelb.edu.au/guides/design-history-id.html
And The History and Philosophy of Technology / Industrial Design:
And a more Industrial Design guides can be found:
Australian Museums and Galleries Online contains a list of useful links
http://agol.org.au/

Each week you will need to bring:
A Digital camera, tram / train tickets and an A5 visual diary, pens etc.

ESSENTIAL READING:
1. Fry, Tony 1988, Design history Australia : a source text in methods and resources, Sale &
   Irregulars and the Power Institute of Fine Arts, Sydney
   Call Number:745.44594 F947
   Location:Stanton Library

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27 July</td>
<td>INTRODUCTION / about the projects - Systems thinking and the value of ‘doing’ history for design.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Learning Contract Lodged</strong></td>
</tr>
<tr>
<td>2</td>
<td>1 August</td>
<td>Ways of doing History - positioning the Author / Voice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rapid systems approach to Histories of Industrial Design</td>
</tr>
<tr>
<td>3</td>
<td>8 August</td>
<td>Historical narratives / Effective Histories / Actor Network Theory as a model</td>
</tr>
<tr>
<td>4</td>
<td>15 August</td>
<td><strong>Morning</strong> (9:00am-11:30am) Tutorial: Establishing Significance <strong>Afternoon</strong> (12:30pm-3:30pm) Excursion</td>
</tr>
<tr>
<td></td>
<td>Double Session</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>22 August</td>
<td><strong>Morning</strong> (9:00am-11:30am) Tutorial: Positioning the artefact / The role of the ‘institution’, and the institutionalising of the ‘role’ <strong>Afternoon</strong> (12:30pm-3:30pm) Excursion</td>
</tr>
<tr>
<td></td>
<td>Double Session</td>
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<tr>
<td>6</td>
<td>29 August</td>
<td>Assessment Task One Due (peer review)</td>
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<td></td>
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<td>Holiday Vacation</td>
</tr>
<tr>
<td>7</td>
<td>5 September</td>
<td><strong>Morning</strong> (9:00am-11:30am) Tutorial: Assessment Task Two Due (peer review) <strong>Afternoon</strong> (12:30pm-3:30pm) Excursion / Special Activities</td>
</tr>
<tr>
<td>8</td>
<td>12 September</td>
<td>No scheduled classes / Autonomous</td>
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<tr>
<td>9</td>
<td>19 September</td>
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<tr>
<td>10</td>
<td>26 September</td>
<td>Assessment Task Three Due (peer review)</td>
</tr>
<tr>
<td>11</td>
<td>3 October</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>10 October</td>
<td>Review/edit draft text for books and posters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Collective Project team focus</td>
</tr>
<tr>
<td>13</td>
<td>20-24 October</td>
<td><strong>SHUT VAC</strong> Last class / wind up / loose ends Feedback / reflecting on what has been learned</td>
</tr>
<tr>
<td>14</td>
<td>31 October</td>
<td>All FINAL CASE STUDIES DUE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>POSTERS/ EXHIBITION DUE / BOOK DUE</td>
</tr>
</tbody>
</table>
Appendix. 4. Transfer Studio Poster and Course Outline

TRANSFER STUDIO | TAKING INVENTIONS FURTHER

RMIT INDUSTRIAL DESIGN | UPPER POOL STUDIO | Semester 2, 2008
For Design studio 4, 5 & 6 Students [GRAP1034-1035-2221] [24 credit points]
Lecturer: Liam Fennessy Prototyping: Beau Leonard
WHEN: 1:30-5:30 Tuesday Afternoons + Weekend Workshops [9, 10 & 23 August]
Where: 874.18, Gossard + Other Places

Outside of the established design and production economies there are considerable innovation practices that result in new products and solutions to the daily problems that ordinary people face. Much of this design activity is innovative by virtue of the proximity of the inventor to the problems that they are trying to solve – daily problems, problems that are localized, problems that a generalized and external design approach, and producer prerogatives often fail to address. Much of the design in this context is non-expert, and frequently these ideas do not account for the economic realities of production, distribution and brand, the realities of use and mis-use and the particular approaches that trained designers have to form, material, functionality and advocacy of particular ideals mediated between the producer, the production process, users and that which is impacted both during and after use.

This studio looks at the redesign of grassroots inventions and practical (non-design) traditions from India and Australia – for applications in India, Australia, and almost anywhere else in the world. India has in place numerous practices and devices that could be adapted for use in Australia and vice versa. Australia has a rich history of industrialized ingenuity informed by migrant communities bringing knowledge, the need to adapt that knowledge to suit the Australian conditions, and the merging of these knowledge through multicultural society. As India and Australia become more economically connected there is an opportunity to develop strong linkages between inventors and designers, to begin to understand the capacities of manufacturers and markets within and between the two countries. Australia and India consistently demonstrate considerable ingenuity, but there is a ‘disconnect’ between the inventor community and the design community primarily because they exist at different ends of the idea and production spectrum.

This studio is about engaging with these inventors and their particular approaches to appropriate technologies and service systems through a range practical design projects as a part of a long-term research collaboration with the National Innovation Foundation (honeybeer network, SRISTI, GIAN), and other organizations that advocate on behalf of inventors. There is an emphasis on product redesign as a way of enlarging the potential scope of a set of inventions, on design for manufacture and design communication. Students will work in teams on a major project for a real client on a product that is already on the market but requires design input. The major project has a working prototype outcome and a focus on technical, material, aesthetic and exportability performance improvements. Students will walk through a process of presenting and reporting their design work in a professional manner. Students will also engage in a range of research, concept design, and new product development minor projects as a way of establishing an approach to design practice that is both exploratory, reactive and proactive. From this work each student will build a portfolio of design projects that will be presented at the end of semester.

The studio has a total duration of 14 weeks, and will include some intensive weekend workshops (9, 10 & 23 August) that focus on specific aspects of design and production. Additionally there is an Autonomous study / project period of three weeks where no formal studio classes are scheduled but specialized support will be given for design detailing and prototyping. This studio is ideal for students that want an experience of design for manufacture and a greater appreciation of contextually appropriate design methods and practices.

Photo: Making glass-coated kite strings in Ahmedabad, India
TRANSFER STUDIO | TAKING INVENTIONS FURTHER

Outside of the established design and production economies there are considerable innovation precincts that result in new products and solutions to the daily problems that ordinary people face. Much of this design activity is innovative by virtue of the priorities of the economy for the problems that they are trying to solve — daily problems, problems that are broader, problems that are generalized and external design approach, and producer pragmatics often fail to address.

Much of the design in this context is non-export, and frequently these ideas do not account for the economic realities of production, distribution and brand, the realities of use and risk-size and the particular approaches that trained designers have to form, refine, functionally and visually, the particular approaches that trained designers have to form, refine, functionally and visually. The studio looks at the co-design of innovative and practical (non-design) ideas from India and Australia for applications in India, Australia, and available anywhere else in the world. India has a place in the world, the production process, and that which is imported both during and after use.

As India and Australia become more economically connected there is an opportunity to develop strong linkages between inventors and design. To begin to understand the capacities of manufacturers and businesses within and between the two countries. To do this there exists the need for a mechanism to build innovations and bridge cultural and contextual differences between Australia and India. The project is done as part of a collaboration with the National Innovation Foundation (NIF), Victorian government, and is an Indian non-profit organization that advocates on behalf of inventors.

The studio has a focus on product design as a way of engaging the potential scope of a set of inventors, on design for manufacture and design communication. Students will work in teams on a major project for real clients on a product that is widely on the market. This requires design input.

The major project has an evolving project outcome and is focused on technical, material, aesthetic and functional performance of an improvement. Students will go through a process of designing and reporting their design work in a professional manner. Students may engage in a range of research, concept design, and new product development minor projects as a way of establishing an approach to design practice that is both creative and practical. From this work each student will build a portfolio of projects that will be presented at the end of the semester.

The studio has a focus on specific aspects of design and production. Additionally there is an independent project period of five weeks where no formal studio classes are scheduled but specialist support will be given for design detailing and prototyping at the Industrial Design Workshop (Building 49).

In undertaking the studio tutorial you will gain an increased:

- Understanding of practical product design methods
- Understanding of appropriate design for manufacture and export
- Capabilities in mechanical design, design presentation methods, professional practice, concept generation, prototyping and reporting
- Capacity in working in design teams towards a common client-oriented design outcomes
- Capacity to articulate design concepts into prototyped outcomes
- Skills in design research, thinking and realization
- Awareness of other contexts and approaches to industrial design activity
- Exposure to various media of innovation and invention and the roles that designers can play in these areas

DESIGN PROJECTS

Group Major Design Projects:
The studio is taught by four different major design projects for our client — the National Innovation Foundation — that will be done in teams of four (4) students. These projects are all related to the design and production of ‘homeware’ full scale working prototype, and also the design of future development of these products. Each major project requires full design development, prototyping, presentation and reporting.

- Understanding of appropriate design for manufacture and export
- Capabilities in mechanical design, design presentation methods, professional practice, concept generation, prototyping and reporting
- Capacity in working in design teams towards a common client-oriented design outcomes

The major project is weighted at 60% of the overall studio project.

All group members will receive the same grade.

Individual Design / Invention Projects:

From the list of projects below you are to work individually or in small groups towards developing a speculative design solution to many of these probability and opportunities as you can / feel compelled to do. These projects can be taken to whatever level of resolution you desire — but you should think about these projects as means of developing a body of design work for your portfolio. Some of these projects have tight constraints and clients, while others are more speculative.
Each of these projects will be documented in your A3 visual journal through sketches and annotations.

At the end of the semester you are to present these Design / Invention projects as a set of A3 presentation panels for each Design / Invention Project that you have worked on. Some may have been taken to a fully resolved design and prototype outcome, others may be partially speculative and illustrative. These Presentation Boards are to be constructed from drawings done in your A3 journal.

The aim here is for you to develop a practice of independent design inquiry as a way of thinking through problems and building capabilities. You need to be strategic about the minor projects that you choose to work on. i.e. Link the minor projects to the content needs of the major project that you are doing, or particular ideas that you develop as you pursue the future.

In order to get a pass grade you should be working on at least 10 of these projects to a drawn presentation level. For higher grades you need to take these projects to a level of design and research resolution beyond being sketchy responses and rough ideas. For really high grades you should be working on full design documentation and prototyping at least of one of these projects.

Not all of the projects in the tables below:

**REVIEW & ASSESSMENT**

The studio will encourage self-evaluation processes to enable students to develop understandings, learning direction, evaluation of achievements and application of personal resources. Grades will be negotiated through individual Learning Contracts. Each student will be guided in developing a seminar work plan by the teaching staff in the first weeks of the course. This plan takes the form of a learning contract where students commit to a course of learning of particular interest and aspirations as well as an individual learning contract, and the production and submission of a portfolio learning directory. Learning Contracts are a way for the student to make transparent their intentions and aspirations in relation to academic progress and learning outcomes to their teacher and peers. Students communicate a grading by describing what they seek to achieve when they have familiarised themselves with the parameters of the course and the assessment criteria. This ‘involuntary’ grade will assist lecturers in directing relevant feedback to the individual learner. Any level of commitment (grading) is seen a legitimate this context as it will be balanced against overall feedback and expressed criteria that the student may have in study or life outside university. Students and lecturers can seek to negotiate the expected grade (either up or down) at any time during the semester. The role of course returns in your assessment is to assist you in a way that is fair to both your aspirations and the demands of the course content. Ultimately the assessment tasks submitted by the student must fulfill the relevant assessment criteria for an applied grading to be reported.

Peer Reviews, Feedback, Critique And Collaboration

Engaging in the work of peers is important for individual and collective development. Much of the feedback on submitted work will be via peer review, and students will be responsible for soliciting critique from peers and providing it to others when asked. Lecturing staff will communicate academic achievements and issues in relation to your approach to, and submission of assessment tasks in a variety of ways.

- Formal Feedback: A written response to your work in reference to the specific learning objectives of the assessment task. Feedback will either be emailed to you or distributed on the return of your hard copy submission.
- Informal Feedback: Verbal feedback that takes place through discussion and correspondence. Informal feedback is generally related to your ongoing academic performance.
- Critique: A response (generally verbal) that teachers and peers give to the formal presentation and articulation of your inquiry.

The criticism you receive is always aimed at how you can improve your academic performance in view of professionalism, conceptually and theoretically rigorous practices.

**SUBMISSION REQUIREMENTS**

All work is to be submitted at the point of presentation. Late work is not accepted. If you are having issues (due to illness or some other reason) that will impact on your ability to submit the work it is advised that you speak to your lecturer and arrange an extension of time or seek special consideration through the ELC.

**REFERENCES & LINKS TO GET STARTED**

- For information on American International design and engineering standards: [http://www.aic.edu](http://www.aic.edu)
- The Appropriate Technology Source Book: [http://www.appropriate.org](http://www.appropriate.org)
- The Invention Dimension: [http://www.appropriate.org](http://www.appropriate.org)

**CITATION LINKS**

*Each week Readings will be distributed and you are expected to read widely into the various aspects of your design projects.*
<table>
<thead>
<tr>
<th>Group</th>
<th>Major Design Projects:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The clients are a mix of four different major design projects for our client - the National Innovation Foundation (NIF) - for students. The projects are:</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Projects</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research and Development</td>
<td>Focus on developing technology for new materials and methods, with emphasis on sustainability.</td>
</tr>
<tr>
<td>Urban Design</td>
<td>Emphasize on mixed-use development, focus on pedestrian-friendly design.</td>
</tr>
<tr>
<td>Product Design</td>
<td>Focus on design that is both sustainable and aesthetically pleasing.</td>
</tr>
<tr>
<td>Environmental Systems Design</td>
<td>Emphasize on renewable energy and water conservation.</td>
</tr>
</tbody>
</table>

| Resources | Uses of plastic, glass, and metal. |

| Challenges | Focus on cost-effective, sustainable solutions. |

| Sustainability | Emphasize on sustainability and responsible design. |

| Goals | 1. Reduce waste. 2. Enhance the user experience. 3. Increase accessibility. |

| Case Study | Example: Design a sustainable, cost-effective system for a small community. |

| Conclusion | The project is a success, with positive feedback from the community. |

| References | Cite relevant research and design principles. |

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### Problem Brief

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>CLIENT</th>
<th>PROBLEM BRIEF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bicycles Seat Design Enhancement</td>
<td>Developing a product that can be used as a power-assisted accessory for electric and manual cycles.</td>
</tr>
<tr>
<td>2</td>
<td>Low-Cost Windmill Bem Water Pump</td>
<td>Developing potential product applications for the product power generation mechanism developed by the inventor.</td>
</tr>
<tr>
<td>3</td>
<td>Domestic Non-Electric Cold Food Storage Technologies &amp; Products</td>
<td>Designing and innovating new methods for storing and transporting food over long periods of time.</td>
</tr>
<tr>
<td>4</td>
<td>Passive Water Purification Devices</td>
<td>Enhancing the functionality and efficiency of existing water purification systems.</td>
</tr>
<tr>
<td>5</td>
<td>Low-Cost Windmill Power Generator</td>
<td>Developing a low-cost and sustainable electricity generating method for use in rural and remote areas.</td>
</tr>
<tr>
<td>6</td>
<td>Indoor Delivery Products</td>
<td>Designing and prototyping of indoor delivery systems.</td>
</tr>
<tr>
<td>7</td>
<td>Wind Machine Toys</td>
<td>Designing and prototyping of toy wind turbines.</td>
</tr>
<tr>
<td>8</td>
<td>Wall Art Rope Climbing Toys</td>
<td>Designing and prototyping of wall climbing toys.</td>
</tr>
<tr>
<td>9</td>
<td>“Money for Milk” Game</td>
<td>Developing a microfinance style board game that targets the youth family collective movement &quot;Amul&quot; as a base.</td>
</tr>
<tr>
<td>10</td>
<td>Technology / Society Hybridization Game</td>
<td>Designing a challenging digital game that gets users (children) adults) to engage: a) Appropriate Technological solutions to problems of daily life b) Appropriate Economic solutions to problems of daily life.</td>
</tr>
<tr>
<td>11</td>
<td>Low Carbon Living Game</td>
<td>Designing a board game for children, adults and families that simulates a carbon trading economy on a household level, where the players have to make decisions based on criteria of maximization of benefits and the objective of the game is to keep house carbon-positive (likeuturn).</td>
</tr>
<tr>
<td>12</td>
<td>Milking Machine Concepts</td>
<td>Analyzing the efficiency and sustainability of existing milking machines.</td>
</tr>
<tr>
<td>13</td>
<td>Palm Tree Climber Concepts</td>
<td>Designing a new concept for a palm tree climber.</td>
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<tr>
<td>14</td>
<td>Venting Machine Concepts</td>
<td>Analyzing the efficiency and sustainability of existing venting machines.</td>
</tr>
<tr>
<td>15</td>
<td>Washing Machine Concepts</td>
<td>Anayzing the efficiency and sustainability of existing washing machines.</td>
</tr>
</tbody>
</table>

### Other Projects as They Arise

- **Frillife Life Research Project**
  - **Method:** Analyzing the patterns of use of local traditional practices.
  - **Steps:**
    1. Take a photo of the items of your household that you use on a daily basis and analyze them.
    2. Identify the patterns and opportunities for re-thinking the product type.

*Note: This document contains information on various projects, their clients, and problem briefs. The table provides a structured overview of the projects, while the text below offers a brief description of the problem briefs for each project.*
<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-Oct</td>
<td>4 pm</td>
<td>Reviewing Project Plans and Graduate Courses</td>
</tr>
<tr>
<td>11-Oct</td>
<td>4 pm</td>
<td>Collaborative and Peer Review</td>
</tr>
<tr>
<td>13-Oct</td>
<td>4 pm</td>
<td>Auctioning / Credit and Debtor Management</td>
</tr>
<tr>
<td>14-Oct</td>
<td>9 am</td>
<td>Group Technical Review</td>
</tr>
<tr>
<td>19-Oct</td>
<td>9 am</td>
<td>Group Technical Review</td>
</tr>
<tr>
<td>20-Oct</td>
<td>9 am</td>
<td>Auctioning / Credit and Debtor Management</td>
</tr>
<tr>
<td>24-Oct</td>
<td>9 am</td>
<td>Auctioning / Credit and Debtor Management</td>
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<tr>
<td>25-Oct</td>
<td>9 am</td>
<td>Auctioning / Credit and Debtor Management</td>
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<tr>
<td>26-Oct</td>
<td>9 am</td>
<td>Auctioning / Credit and Debtor Management</td>
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<td>Auctioning / Credit and Debtor Management</td>
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<tr>
<td>26-Oct</td>
<td>8 pm</td>
<td>Auctioning / Credit and Debtor Management</td>
</tr>
</tbody>
</table>

**Notes:**
- All activities are to be conducted online.
- The schedule is subject to change without notice.
- Participants should ensure they have access to the necessary technology.
- Attendance is mandatory for all sessions.
Appendix. 5. Quick Fix Studio Poster, Recruitment (Balloting Images) and Course Outline

[Transfer Studio] QUICK FIX
RMIT INDUSTRIAL UPPER POOL DESIGN STUDIO SEMESTER 2, 2009
GRAP 1034, 1035 & 2221 / 24 CREDIT POINTS
LECTURER: LIAM FENNESSY
WHEN: 1.30-5.30 MONDAY
WHERE: B 45 STUDIO C
[Transfer Studio] QUICK FIX

RMIT INDUSTRIAL DESIGN UPPER POOL DESIGN STUDIO SEMESTER 2, 2009
GRAP 1034, 1035 & 2221 / 3 CREDIT POINTS
Lecturer: Liam Fennessy
Contact: 
When: 1:30-5:30pm Mondays
Where: 45.1.0 (building 45, level 1, studio C - 33 Lygon St Carlton)

IMPORTANT: STUDENTS NOTE:
You must read the appropriate Course Guide for the Upper Pool Design Studio level that you are enrolled in (either GRAP 1034 Design Studio A, GRAP 1035 Design Studio B, or GRAP 2221 Design Studio D). Course guides are published online and accessible via http://www.rmit.edu.au/courses.

This document is the course tutorial online course guide part C for the particular Upper Pool studio tutorial that you have elected to join. You will find further resources for this tutorial online via the portal above.
1. ABOUT THE AREA OF DESIGN STUDY

Consider the big issues of our time and place: climate change, resource and energy security, de-industrialization, over-consumption and housing affordability. Consider the scale of these problems. Consider their urgency. Consider the pace at which governments, business and society can effect meaningful change. Consider what has been achieved to date. Consider what they mean for you and your future. Consider the implications of maintaining the status quo.

Now consider in the short-term the practice of industrial design as a transitional period of 'quick fixes' – of rapid corrections, of deleting redundancies, of de-materializing and of re-directing. A practice of 'halving' the material, energy, resource usage and space of the 'things' we live with and use to maintain a particular standard of living - of designing and un-designing.

This studio forces us to look beyond what we already know the practice of industrial design to be – a practice of designing for the needs of industry and advocating, through that discourse, design for the needs of user, community, culture and bio-centric notions of environment – to considering the discipline as an entirely new and rethought practice that designs for the changing imperatives of community and culture as a factor of an environment (that includes the artificial and the biological) in order to change industry, and thus the nature of the discipline.

It uses the design studio as a test-bed for this re-thought practice and is framed by two questions.

What could the 'material' future of everyday living look like in the context of a carbon emissions trading active economy, the rapid onset of run-away climate change and the effect of this on the nature of cities like Melbourne?

What will this mean for the ways industrial design is practised?

It requires a problematizing of the status quo - what we do and know now – as de-futuring.

[Transfer Studio] Quick Fix uses design to explore, document, speculate upon and propose ways of making the required changes to the material and resource intensive ways in which we live and work. It will involve surveying and documenting designed redundancies and existing 'fixes', finding opportunities for strategic 'halving' by design, developing these opportunities as design projects (new products and services), and communicating these ideas in practical ways.

The studio uses a mix of real world (client) projects as a testing ground for a new mode of practice and propositional design research projects to explore these questions. The studio classes will be held in building 45, level 1, studio C (33 Lygon St Carlton), and will involve some activities outside the regular Monday time slot and couple of weekend intensives.
2. **KEY LEARNING OUTCOMES**

This Studio tutorial has a range of specific learning outcomes that compliment the general learning objectives described in the Upper Pool Design Studio courses (see the Design Studios 4, 5 and 6 online course guides for more information).

*Please list the specific capabilities that students will learn. For example:*

On completing the studio course, you will demonstrate capacity to:

- undertake philosophically-oriented and propositional design activity
- To demonstrate an acute capacity for abductive reasoning and relational thinking through designing
- conceptualise and develop ideas through 2d and hands-on 3d processes of working individually and collaboratively
- reflect, discuss and critique your work and that of your peers with a range of criteria in mind
- identify key issues facing the profession, and the implications of this on local industries and the quality of material experience of the broader community
- develop design and entrepreneurial opportunities (products and services) considerate of these issues
- to demonstrate design capabilities through a range of communications mediums.
- Develop a method of design practice that is representative of the practice concerns integral to the studio

3. **STUDIO TUTORIAL ACTIVITIES**

Each week there will be in-class learning activities that will help you develop the capabilities required to successfully engage in the tutorial content and assessment tasks.

Activities will include:

- Team oriented design projects
- Reactive and speculative design projects
- Discussion and presentation of design work as it develops

4. **ASSESSMENT TASKS**

Upper Pool studio courses involve you undertaking two types of assessment tasks. Each particular Studio Tutorial will require you to complete tasks that are ‘unique’ to that tutorial and its design investigation. In addition you are to complete tasks that are ‘standard’ to all Upper Pool Studio Tutorials that are to be submitted at the end of semester final presentation review.

**NOTE:** Studio teachers are only able to provide indicative feedback for assessment tasks, as final assessment grading confirmation takes place at end of semester through the process of end of semester review presentations and moderation. The percentage weighting attributed to assessment tasks below indicates the relative importance of each task within the whole course. For further information about the assessment process for all Upper Pool Studio Tutorials consult the course guide online.
4.1 UNIQUE SUBMISSION WORKS

The following individual tasks and collective activities must be completed to an acceptable academic standard to successfully complete the course.

Individual Assessment Tasks for Submission

Major Project: Rethought Practice
(Individual Project) (70% OVERALL)

The major project runs for the full duration of the course and is to be done individually. It has three main objectives: Firstly, as a means of hypothesising a design practice that is capable of functioning in an economy that for the first time has to account for the cost of carbon emitted through business practice, and therefore under significant pressure to re-direct. Second, it provides a methodology for rapid re-appraisal of products and services that do not accord with this new economy through design projects that cover product and production design, Collaborative design, and Service System design. Finally it introduces students to ‘lean’ and smart ways of designing that can contend with the changes that will occur in a carbon constrained economy, and carbon literate community. Each of these objectives is essentially concerned with developing modes of innovation in the areas of design, production, and practice methodologies.

Phase One: Preparation: Configuring a Lean Practice

With the introduction of a carbon emissions trading scheme (ETS) the cost of producing energy from high carbon sources will essentially be come more expensive. The flow on from this is that the cost of utilities for businesses will increase significantly. This cost will be ultimately passed on to consumers. Design Businesses in Australia have traditionally worked on comparatively low margins. With the increased cost of ‘doing’ business this margin is constrained. Labour cost will rise as the cost of living increases. Businesses will need to reduce the cost of designing if they are to maintain market share and grow – as all businesses need to. Many of the products and technologies that we have come to rely on will be come unviable and will need to change.

Configure a prototype of lean design practice by cutting out costs that can be avoided without reducing the quality of design output.

- Source, learn and test and a suite of GNU (open-source) and ‘cloud’ based design and documentation software, data storage and sharing.
- Research and assemble a set of lean and reliable technologies and techniques
- Minimise the space and overhead resources you need to practice design
- Research the effects of an ETS on business in Australia and get prepared.

Keep a detailed record of these methods – their benefits and limitations through a shared blog. Where there are gaps in available technologies design them. This record will form the basis for one section of the final studio report (Task Six).

Ongoing

Phase Two: Contextual Research: Surveying

This task introduces you to visual sociology and design observation as an abductive thinking process critical in designing.

Photograph each room in your house from all angles – in their normal state. Stitch these photographs together so that a full 360° view can be seen. Analyse each 360° view to find
designed redundancies, modifications, site-phases and fixes. These categories will be
granulated as a particular genre for further design projects. Annotate these images as a way
of mapping your analysis. The images produced will form a significant part of your final design
presentation.

Redundancies are instances where the same (or similar) technologies or actions are used for
different products. Sometimes technologies get replaced by new variants but remain alongside
the new versions because they fulfill a specific purpose that the replacement technology does
not.

Modifications are where the prescribed functionality of a product does not adequately fulfill the
needs of the user community – and so changes are made. Included as a subcategory of
modification is ‘re-purposing’ – which is where a product / artefact / technology is given a
second life that is tangential to its original purpose.

Site-phases are where the products or set of products have changing or temporal social lives.
For example a television is not always ‘watched’ and throughout a normal day will have several
different ‘lives’ – or site – phases; it will be off (and possibly serve as a surface for holding other
social or decorative mediums); it will be on for the purposes of deliberate entertainment; for
company; for information; for light and noise.

Fixes are where the broader concerns of economy, ethics or environment have entered into an
appraisal of products and technologies and significant changes have been made in the ways in
which a particular product / technology / resource is used. For example the recent drive to
reduce water consumption in homes has provided many sites of innovation as people change
the ways they use ‘things’ to make water savings. Fixes are typically behavioural rather than
technological but frequently the behavioural change is facilitated by the simple inclusion or
removal of a technological act.

Commence week two
Present week three
Represent week six (mid semester crit)

Phase Three: Concept Design: Proposing Deletions and Re-directions

From your visual sociology in Task Two propose a series of deletions and re-directions as
design projects. These proposition will form the basis of your design project in the next phase
of the studio.

Format: Sketch propositions (concepts) with a 150-word description of each proposition
Details of format to be developed by the studio.

Commence week three
Due for presentation in WEEK SIX (mid semester crit)

Phase Four: Design: Product / Service System

Building on the propositions in the previous phase develop your design into a resolved product
and service system. This can be approached in two ways:

[Option A] New Product and Production Design
Focus your project on the design and production of a specific product or products that
responds the thematic concerns of the studio. The product and production process that you
design need to be based on sound research and must be communicated as fitting into an
adequately described and understood system or ecology of other products, peoples practices,
material and resource economies and services. This will require you to design the product and its production process with a clear service system in mind – no products exist in isolation. The product must be highly resolved (aesthetically, technically and culturally).

[Option B] Service System Design
Focus your project on the design of a Service System that responds to the thematic concerns of the studio. A service system is a strategy for delivering a particular service that deals with a specific set of problems or opportunities. Services are especially enterprises that are designed for others to take on. Usually enterprise development is done from a business or entrepreneurial perspective where economic imperatives act as the driver. Service design from a ‘design’ perspective focuses on making changes to the ways people live or work in view of larger systemic concerns such as poverty reduction, capability development, health and wellbeing, education or environmental change. Services typically have a suite of products or technologies at their centre – these will have to be designed as well and given adequate detail to communicate their intent.

Commence week six
Ongoing presentation: week seven, eight, and nine.
Due Week Ten for full presentation prior to moving into the prototyping phase.

Phase Five: Prototype
Acting on feedback from the previous phase prototype your design. This may involve making a production process to make products, or setting up and trailing a pilot of a service system. Prototyping in this studio is NOT making a representation of your design – it is making the real thing and making it work in line with the broader concerns of a future where carbon emissions are factored into the cost of designing. Document this work thoroughly as it will be used in the final report.

Due Week 14

Phase Six: Quick Fix Design Report [forms the basis of the ‘standard submission’]

Write an essay that describes in a scholarly way what your project is, how it was done and what, what it means as a practical speculation on the future of industrial design practice, and what you have learned. All students essays will be compiled into a ‘book’ / ‘Web-site’ / ‘Exhibition’ of the studio. This essay will form the textual component of your ‘Standard Studio Submission’ and the basis of your final studio presentation (critique)
It will have the following sections:

Project Title
Your Name

Abstract of the Project: 100 word description of the design project, its aims and key findings.
A single image that powerfully communicates the outcomes, process and content realises your design project.
A small image of your face / head

Introduction: A maximum of 400 words that communicate: What is the project? Who are its stakeholders and why is your project important? What are the issues that your project has engaged with? Why have you developed the project as you have?

Body: A set of three 250-word paragraphs in the following order:
- A 250-word text reflecting upon your engagement with the stated learning objectives of the level of upper pool studio you are enrolled in (Studio 4, 5 or 6) during the studio experience
- A 250-word text reflecting upon your engagement with the specific learning objectives of the Transfer Studio. Include
A 250-word text that discusses how and why you have configured your notion of design practice within this studio and what capabilities you have developed.

Conclusion: A 250-word text on how the design project you have done matters as a speculation on the future of your practice as a designer.

Include:
- A diagram that aims to communicate the most important aspects of you having learnt new capabilities and design knowledge in this semester’s studio, in the context of your existing design studio practice
- 3-6 small images from your studio work that are indicators of the key design practice capabilities and knowledge you developed this semester. Annotate these images with captions and/or an overlayed diagram to ensure that a reader can identify the design practice capabilities and knowledge you believe you are indicating.

References: All references to be properly attributed in the style guide provided.

Format: to be developed as a minor project – templates and details to be provided
Due: Week 13

Minor Projects: Testing the Practice
(Group Projects) (30% OVERALL)

There are three minor projects that will be approached by the studio as a collective. This is where we get to test and share the practice methodologies that we develop through research in the individual major projects. Each minor project is for a client and each student will take on a leadership/project management role for one of the three projects. All students will work on all projects.

Project One: HEARD
Clients: Artists: Rhys Turner & Melissa Ramos and Experiments
Brief: To design, prototype and test a sensing head-piece for an experimental / new media art work to the brief / specifications supplied.

Project Two: Quick Fix
Clients: Our Studio
Brief: To design, distribute and develop a set of publication and exhibition templates for disseminating projects done in the studio. This will involve graphic design, web design, exhibition design.

Project Three: FORAGE - Technical Design and Prototyping
Clients: Landscape Architecture Forage Studio Student Design projects
Brief: To develop and prototype ‘hard’ outdoor environmental products from initial designs by Landscape Architecture students for the Avoca Environmental Living Festival. Details to be negotiated.
NOTE: This project may require a site visit to Avoca on the weekend of 10th and 11th of October.

NOTE: THESE ARE LIVE CLIENT PROJECTS. DUE DATES AND FORMATS WILL BE NEGOTIATED AS THE PROJECTS PROGRESS.

Other Activities:

Peer and Self Review:
All tutorial participants will be required to appraise the Quick Fix project work of other students and themselves. You will have to review and make recommendations to peers regarding the demonstration of their learning through submissions.

[Transfer Studio] Quick Fix – studio tutorial guide  p7
4.2 STANDARD SUBMISSION WORKS

In addition to Unique Submission requirements, you are required to submit the following works at the end of semester Studio Presentation Review for moderation of the quality of your academic performance relative to your course level across all Design Studios offered in this semester. The following deliverables constitute the Standard Submission Works:

**Publication Poster Set**

**POSTER 1:** composed project presentation of images. This poster aims to communicate the strength of your studio project work in the simplest most powerful ways possible through imagery. It is to include:
- representations or smaller versions of the Unique Submission Works, carefully composed to convey the most important ideas, qualities and elements of your studio project work so as to cohere as a whole presentation
- a maximum 100 word description of the project
- very short annotations or small captions to images and diagrams if appropriate

**POSTER 2:** project description. This poster aims to communicate your studio project work to a higher level of complexity. It is to include:
- A maximum of 200 words that communicate:
  - What is the project?
  - Who are the stakeholders for the project and what do they care about it?
  - What are the issues that your project has engaged with?
  - Why have you developed the project as you have?
- six key images that best communicate the merit of the project in its detail

**POSTER 3:** Learning Testimonial Poster. This poster aims to provoke you to (i) reflect upon your learning experience in the current studio semester, and (ii) to develop and describe your self-understanding of this experience in the context of your past design practice experience and future aspirations. It is to include:
- A 250 word text reflecting upon your engagement with the stated learning objectives of the level of upper pool studio you are enrolled in (Studio 4, 5 or 6) during the studio experience
- A 250 word text reflecting upon your engagement with the specific learning objectives of the particular Studio tutorial you have undertaken this semester
- A diagram that aims to communicate the most important aspects of you having learnt new capabilities and design knowledge in this semester's studio, in the context of your existing design studio practice
- 3-6 small images from your studio work that are indicators of the key design practice capabilities and knowledge you developed this semester. Annotate these images with captions and/or an overlayed diagram to ensure that a reader can identify the design practice capabilities and knowledge you believe you are indicating.

**PORTFOLIO**

All studio 4, 5 + 8 students are required to submit a digital design portfolio (pdf) formatted to A3 size in landscape format, submitted online via the studio blackboard drop box (tdo) before Final Presentation Reviews. The Portfolio is to be a self-curated comprehensive arrangement
of the semester’s studio work, arranged in such a way as to communicate the key aspects of exploration and development in the project work. It will include:

- evidence of the paths of investigation you have undertaken during the studio tutorial. This is to include paths of investigation that you ceased to develop, as well as the major paths of investigation that brought about culmination in your project work;
- Copy of the above Publication Poster Set
- copy of learning contracts negotiated with the Studio teacher
- completed copyright permission form granting permission for your work to be published online and in print by RMIT.

NOTE: All posters are to be A3 size in landscape format utilising the template given. Posters are to be submitted as high quality prints for presentation and as digital files uploaded to the specified online site.

ALL STANDARD SUBMISSION WORKS DUE: at end of semester review presentation in wk 14

5. RESOURCES

The online RMIT Learning Hub (often called Blackboard) is the portal for the formal information about this course and can be found at: http://www.rmit.edu.au/learninghub

The Course Guide for Upper Pool Design Studios 4, 5 and 6 can be found online via the above link.

Industrial Design Library Subject Guides can be found at: http://www.lib.rmit.edu.au/guide/industrial-design.html

Additional resources will be available on the Studio Blackboard resource.

Specific Reading and References will be provided as the course unfolds.

Mandatory reading:

Equipment Required
Each week you will need to be prepared to work with A3 size paper, an A5 visual diary, pens etc, a digital camera, a tape measure and other specific tools and consumable materials as required for undertaking tasks.

Excursions
This tutorial may involve excursions to various places. Some of these excursions will require you to pay a fee for transport or access to venue. If you are having real difficulties in being able to pay for set excursions please speak to your lecturer and/or course coordinator so that alternatives can be arranged. Details on excursions and extra curricula activities will be given in advance.

[Transfer Studio] Quick Fix – studio tutorial guide  p9
Silence
and other ways

The studio is a collaborative research unit, involving Design and Landscape Architecture. One of the studio's main goals is to create a unique environment that encourages students to explore different ideas and approaches. The studio aims to provide an environment that is conducive to creative thinking and innovation.

The studio environment will focus on design as a way of learning. Students will be encouraged to think critically and to develop their own ideas and perspectives. The studio will be set up as a workshop where students can work together and learn from each other. The studio will be a space for students to experiment with different ideas and to develop their own unique approaches to design.
Appendix. 7. This Side of Pinnaroo Studio Poster
this side of pinnaroo

[an industrial design and landscape architecture collaborative design studio]

Lecturers: Liam Fennelly (industrial design) & Fiona Hamilton (landscape architecture)

What: An industrial design and landscape architecture collaborative 24 credit point upper pool design studio

When: Tuesdays 1.30-5.30pm (and other times) & intensive excursions (up to 5 days)

Where: 57 A 18 / Field research in the Wimmera – Mallee and other places far away

About The Studio

If you are interested in cultural differences, histories of resource extraction, production and distribution, invention, sheep, wheat, silos, channels, civil infrastructure, sandstone, salt, sand, sky, scrub, silts, eucalyptus, white pine, dust, honey, soldier settlements, tylol trains, rabbits, talking, tamings, mice plague, footy, dry lakes, trains, trucks, tractors, drought, mallee root, ants, eucalyptus oil, railway sleepers, emus, sheep, pigs, CWA, soil, agriculture, natural systems, bore water, rural landscapes, food production, ring barked trees, appropriate technologies, experimental photography, drawing, road trips, documenting, making, being out doors, cold nights, questioning, reflecting, exploring, working hard, people, production and place then this studio is for you.

The Studio As A Survey

Here the notion of the ‘studio’ is re-framed as a space for immersion into a particular and unfamiliar context and is structured as a series of adventures this side of Pinnaroo. It invites students to explore ways of understanding the relationships between people, production and place and the transfer of knowledge and practices between rural and urban communities through field surveys in Melbourne and north-western Victoria. Methods for observing, collecting, analysing, appreciating and inferring in view of designing will be developed through the semester so that the learner has a set of tested refined and individually appropriate techniques and technologies for future field work. There will be a series of design activities that will provide opportunities for students from the two disciplines to share understanding, to contribute to each other's learning and to traverse discipline boundaries.
Appendix. 8. No Fixed Address Studio Poster and Course Outline

No Fixed Address

The studio explores themes through a range of client, site-specific and individual design projects and asks the student to research, consume and activate through field work and prototyping, prototyping products that involve the components of alternate or parallel types that are emerging in Melbourne. It will introduce students to design methodologies and user-centred design, productive economies of design and the expansion of social design.
IMPORTANT - STUDENTS NOTE:
You must read the appropriate Course Guide for the Upper Pool Design Studio level that you are enrolled in (either GRAP 1034 Design Studio 4, GRAP 1035 Design Studio 5, or GRAP 2221 Design Studio 6). Course guides are published online and accessible via http://www.rmit.edu.au/learninghub.

This document is the course tutorial outline (course guide part C) for the particular Upper Pool studio tutorial that you have bailed to join. You will find further resources for this tutorial online via the portal above.
Transfer Studio: No Fixed Address

Lectures: Liam Feneeney
With: Lynda Roberts (Interior design)
And Cer-Han (Public Arts)

Contact:
Time: 1.30pm - 5.30pm Wednesdays & Occasional Friday Mornings
Location: 65.5.20 + 2DA

1. ABOUT THE AREA OF DESIGN STUDY

The ways in which activities of exchange take place are always changing. Recently, these changes have been compounded by a range of interconnected issues and opportunities: leaps in the flexibility and affordability of mobile communications technologies; the decentralization of organizations; the diversification of organizational structures and agendas; the growth of urban populations; more mobile and diverse worker communities; tele-commuting and working on the move. Increased casualization of the workforce, and a move from an urban economy centered on institutionalized commodity production towards a social, distributed service economy.

Once the realm of block market and cash economies, the home, the car, the train, the park, the footpath and the cafe are now socially legitimate workplaces. Private business is now practiced in very public zones. However, while many of the new technologies and alternative locations of work are “social” in orientation, the “social” dimension of the traditional workplace is now for many a fractured and dismembered experience. The place of working as a social element in the lives of many is now altered.

So what does this mean for ways of working and ways of trading? How might these changes alter the idea of the workplace as a situated or singular space? Is “going to work” now a statement that is divorced from the notion of a “place” of working and only concerned with “acts” of work? Is the act of continual “place making” and “name making” now a central activity of the worker? How might these new modes of working adequately accommodate the diverse needs and expectations of the communities and individuals impacted by these changed loci of work? What effect might this fracturing of the work place, as a community of practice, have on the quality of production and service delivery? How might design mediate these shifts in ways that balance commercial needs with those of the greater public in ways that are inclusive of the diversity of approaches that people have to “acts” of working? How could the infrastructures of these new modes of working and trading be reconsidered through design?

This studio explores these ideas through a range of client, inter-disciplinary and individual design projects and asks the student to research, conceive and articulate through field-work and prototyping, propositions and products that mediate the complexities of production/production systems for a range of enterprise types that currently exist in Melbourne.

About the Transfer Studio Studies:
Transfer Studio is a collection of research and community linked design studios that over the past three years have sought to explore opportunities for industrial design to intersect the disciplines of service design, design strategy, and sustainability with the pragmatic core of additional product design and the sensitivities to use, context, culture, production, environment and economy of industrial design. The studios act as space to learn in ways that are speculative of the future practices possible in design and engaged with real world enterprises and real world concerns.
2. KEY LEARNING OUTCOMES
This Studio tutorial has a range of specific learning outcomes that complement the general learning objectives described in the Upper Pool Design Studio courses (see the Design Studios 4, 5 and 6 online course guides for more information).

On completing the studio course, you will demonstrate capacity to:
- undertake community-oriented design activity
- conceptualise and develop ideas through 3d and hands-on 3d processes of working
- generate and communicate ideas for practical structural forms
- work collaboratively with diverse project stakeholders and other designers to explore and develop design ideas of mutual value
- reflect, discuss and critique your work and that of your peers with a range of criteria in mind
- identify and develop design opportunities for new and alternative enterprise types and their use that resonate with contemporary issues and experiences
- Develop a deeper understanding of client oriented and interdisciplinary design projects
- See a project through from concept development, detail design, prototyping and testing
- Develop an understanding of discourse in social design, sustainability and service design

3. STUDIO TUTORIAL ACTIVITIES
Each week there will be in-class learning activities that will help you develop the capabilities required to successfully engage in the tutorial content and assessment tasks. Activities will include:
- Rapid concept development and realization
- Field work
- Undertaking peer review discussion of each others work in progress
- Developing ideas through drawing, photography, 3d modeling, making test-rigs and prototypes
- Taking on a project management leadership role
- Engaging with clients and other discipline to deliver a design project

4. ASSESSMENT TASKS
Upper Pool studio courses involve you undertaking two types of assessment tasks. Each particular Studio Tutorial will require you to complete tasks that are ‘unique’ to that tutorial and its design investigation. In addition you are to complete tasks that are ‘standard’ to all Upper Pool Studio Tutorials that are to be submitted at the end of semester final presentation review.

NOTE: Studio teachers are only able to provide indicative feedback for assessment tasks, as final assessment grading confirmation takes place at the end of semester through the process of end of semester review presentations and moderation. The percentage weighting attributed to assessment tasks below indicates the relative importance of each task within the whole course. For further information about the assessment process for all Upper Pool Studio Tutorials consult the course guide online.

4.1 UNIQUE SUBMISSION WORKS
The following individual tasks and collective activities must to be completed to an acceptable academic standard to successfully complete the course.

Collective Activities
Project One: “The Social Studio Challenge”

A collaborative design challenge to design a mobile clothes store for fashion design and training enterprise “The Social Studio”. This challenge will involve learning up with an interior design student to rapidly design a bespoke mobile fashion retail outlet. All designs will be judged and the two concepts deemed most viable given the needs of the client will be taken into a second stage by the industrial design studio for design detailing and prototype production. The two prototypes will then put into testing by The Social Studio.

In this second stage students have a chance to either work on the design detailing and prototyping of the mobile shops or if designing and developing management-oriented products for possible integration into the training regimen and production scheme of The Social Studio.
Task One: The Social Studio Challenge / Concept Development

The first 6 weeks of the studio are dedicated to working on this project. You will partner with a student from Interior Design to design a concept for a mobile retail-leading outlet that fits in a Cargo Bicycle. Studio sessions will take place on Friday mornings so that interior design and industrial design students can work together.

This project will require you to:
- Research cargo bicycles and mobile and bicycle-based enterprises
- Visit the Social Studio, meet the user group and come to understand their particular requirements through stakeholder and participatory design process
- Research and respond through design to the material nature of the proposed enterprise and its mission
- Develop design ideas via a range of processes including: 1:1 testing, form and material experimentation, sketching and role-playing,
- Refine a chosen design concept and model (at 1:10 scale) a material and temporal response to the task (phyiscal model or digital)
- Make a One Minute Stop Motion Film (OMV) of your model moving through its transition form a roadable vehicle to a fully functioning retail outlet.
- Present your design to the client for feedback and possible selection for prototyping.

Deliverables:
- Concept Visualizations:
  - To be formatted as a finale of 6 x A3 landscape panels and submitted as a PDF Banner and in hard copy. This will include:
    - A Minimum of 5 x Intra Illustrations of the concept that communicate the your design and its various phases and contexts of transition and use.
    - 1 x Description of the conceptual intent and a reflection by the design team on the process of working together.
    - 1 x Annotated material, color and general dimensions specification drawing (344 view)
- Model:
  - 1 x 1:10 Scale Model of the design (gray or white model) that can be used to communicate and test its transitions. That is: A model that can be used to accurately represent the concept, its form and how it moves.
- Movie:
  - 1 x One Minute Stop Motion Animated Film (.MGO) of the model moving through its transitions from a vehicle to a retail outlet.

DUE: Week 6 – Friday 9th of April for presentation

Weighting: 30% of the overall design studio grade

Task Two: The Social Studio Challenge / Design Detailing and Prototyping

Of the two designs selected from the first stage teams of students will complete, refine, detail and produce two testable working prototypes. These prototypes are to be put into use by the Social Studio. All students are to engage in the design decision-making, detailing, and fabrication of the two prototypes (i.e. all students will do a bit of everything). However, each team member will need to take on individual management role to ensure that all required work is done by the team members. This will involve selection and preparation for the role prior to the two designs being selected.

You will need to significantly ramp up your knowledge and skills in your area of responsibility.

These roles include:
- Drawing Manager & Draftsman: This role takes responsibility for the accuracy of team members drawings, delegating and distributing the drawing load across the team, managing assembly drawings, checking isometric / manufacturing drawing sets, setting up drawing, dimensioning and revisions protocols, printing drawing sets, and re-drawing where specifications change through problems and solutions found in the prototyping stage.
- Material sourcing and specification: This role requires close liaison with the Drawing, Prototype and Client Managers. All materials, fittings and fixtures used for the design are specified in conjunction with the client and kept up to date on developments in other areas of management, arranging meetings to show materials samples and design changes and progress on the prototypes.
- Prototype production management: This role involves planning for prototyping, doing cutting lists, delegating prototyping tasks, managing the process within the parameters and limitations of RMV workshops, communicating with technical staff and resolving problems as they arise in the process of making.
- Project Manager / Team Leader: This role involves ensuring that all members are doing what is required of them, resolving conflicts, developing contingency plans and ensuring clear lines of communication and taking responsibility for the entirety of the project.
- Project Documentation: This will involve managing all of the documentation of the project. You will need to be meticulously organized, record all minutes of meetings, photograph the process from start to finish and keep a diary / blog of who did what throughout the project. You will need distribute information as it is required by team members and clients. The project documenter will develop a template for a book / website about the project that tells the story of the social studio project. This book / website will be submitted in week 14.

Social Studio Products

Students can take on an additional project to develop non-garment type products that fit the material, aesthetic and training agenda of the Social Studio. These products will need to be developed through conversations and observations with the client.
community, and will have to be durable, sellable products that provide makers with the opportunity to embellish, modify and customize the design.

DUE: Week 14 – Friday 9th of June for presentation  
Weighting: 30% of the overall design studio grade

Individual Assessment Tasks for Submission

**Project Two: “No Fixed Address”**

Will involve researching and designing a product service system that considers issues of the changing spaces of trade and modes of working with a set of given scenarios as a starting point. You will need to do field work to flesh out the scenario and respond to opportunities and issues that you uncover through the design of a product/service system. The project will commence in week 2 and run through until week 14.

Students are to research, design and document a particular response to the project and submit findings through:

- A comprehensive project report (A5 Book)
- A set of visualizations (min 3 x A1 posters)
- A model / models that communicate the product and service system designed.

DUE: Week 14 – Friday 9th of June for presentation  
Weighting: 40% of the overall design studio grade

4.2 STANDARD SUBMISSION WORKS

In addition to Unique Submission requirements, you are required to submit the following works at the end of semester Studio Presentation Review for moderation of the quality of your academic performance relative to your course level across all Design Studios offered in this semester. The following deliverables constitute the Standard Submission Works:

**Publication Poster Set**

POSTER 1: composed project presentation of images  
This poster aims to communicate the strength of your studio project work in the simplest most powerful ways possible through imagery. It is to include:

- representations or smaller versions of the Unique Submission Works, carefully composed to convey the most important ideas, qualities and elements of your studio project work so as to cohere as a whole presentation
- a maximum 100 word description of the project
- very short annotations or small captions to images and diagrams if appropriate

POSTER 2: project description  
This poster aims to communicate your studio project work to a higher level of complexity. It is to include:

- A maximum of 200 words that communicate:
  - What is the project?
  - Who are the stakeholders for the project and what do they care about it?
  - What are the issues that your project has engaged with?
  - Why have you developed the project as you have?
- six key images that best communicate the merit of the project in its detail

POSTER 3: Learning Testimonial Poster  
This poster aims to provide you to (i) reflect upon your learning experience in the current studio semester, and (ii) to develop and describe your self-understanding of this experience in the context of your post design practice experience and future aspirations. It is to include:

- A 250 word text reflecting upon your engagement with the stated learning objectives of the level of upper level studio you are enrolled in (Studio 4, 5 or 6) during the studio experience
- A 250 word text reflecting upon your engagement with the specific learning objectives of the particular Studio tutorial you have undertaken this semester
- A diagram that aims to communicate the most important aspects of you having learnt new capabilities and design knowledge in this semester's studio, in the context of your existing design studio practice
- 3-6 email images from your studio work that are indicators of the key design practice capabilities and knowledge you developed this semester. Annotate these images with captions and/or an overlayed diagram to ensure that a reader can identify the design practice capabilities and knowledge you believe you are indicating.

PORTFOLIO
All studio 4, 5 & 6 students are required to submit a digital design portfolio (with formatted to A3 size in landscape format, submitted online via the studio blackboard drop box) before Final Presentation Reviews. The Portfolio is to be a self-curated comprehensive arrangement of the semester’s studio work, arranged in such a way as to communicate the key aspects of exploration and development in the project work. It will include:
- evidence of the paths of investigation you have undertaken during the studio tutorial. This is to include paths of investigation that you ceased to develop, as well as the major paths of investigation that brought about culmination in your project work.
- Copy of the above Publication Poster Set
- copy of learning contracts negotiated with the Studio teacher
- completed copyright permission form granting permission for your work to be published online and in print by RMIT.

NOTE: All posters are to be A3 size in landscape format utilizing the template given. Posters are to be submitted as high quality prints for presentation and as digital files uploaded to the specified online site.

ALL STANDARD SUBMISSION WORKS DUE at end of semester review presentation in wk 14

5 RESOURCES
The online RMIT Learning Hub (often called Blackboard) is the portal for the formal information about this course and can be found at:
http://moa-rmit.edu.au/learninghub
The Course Guide for Upper Pool Design Studios 4, 5 and 6 can be found online via the above link.

Industrial Design Library Subject Guides can be found at:

A flickr account has been set up for the studio for storing all photographs – details to be provided.

Specific Reading and References
The following texts may not be available from RMIT Library but can be found in other university libraries and borrowed through the CAVAL card system. These can be obtained from the RMIT Library loans desk.

Reading and resources will be available on the studio blackboard site

Equipment Required
Studio classes will usually be conducted in Building 8B on Wednesday Afternoons and on Friday mornings for the first 6 weeks. The second half of the semester will involve large amounts of time in workshop and CAD labs. Each week you will need to be prepared to work with A3 size paper, an A4 visual diary, drawing equipment, laptops, a digital camera, a tape measure and other specific tools as required for undertaking tasks.

Excursions
This tutorial will involve excursions to various places. Some of these excursions will be done as a group and some will require you to venture out on your own. If you are having real difficulties in being able to attend a set excursion please speak to your lecturer so that alternatives can be arranged.
### Course Schedule

Course schedule to be developed with students – this is a draft only

<table>
<thead>
<tr>
<th>Date</th>
<th>Week no.</th>
<th>Tutor-led In-class activity</th>
<th>Student-led Independent activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 March</td>
<td>1</td>
<td>Course outline to be provided to students Commence Project ....</td>
<td></td>
</tr>
<tr>
<td>5 March</td>
<td>2</td>
<td>Social Studio Challenge Briefing</td>
<td></td>
</tr>
<tr>
<td>10 March</td>
<td>3</td>
<td>Social Studio Challenge</td>
<td></td>
</tr>
<tr>
<td>12 March</td>
<td>4</td>
<td>NO CLASS</td>
<td></td>
</tr>
<tr>
<td>19 March</td>
<td>5</td>
<td>Social Studio Challenge</td>
<td></td>
</tr>
<tr>
<td>24 March</td>
<td>6</td>
<td>NO CLASS</td>
<td></td>
</tr>
<tr>
<td>29 March</td>
<td>7</td>
<td>Social Studio Challenge</td>
<td></td>
</tr>
<tr>
<td>31 March</td>
<td>8</td>
<td>NO CLASS</td>
<td></td>
</tr>
<tr>
<td>7 April</td>
<td>9</td>
<td>Easter break - no classes - F-7 April</td>
<td></td>
</tr>
<tr>
<td>9 April</td>
<td>10</td>
<td>Mid Semester Review</td>
<td></td>
</tr>
<tr>
<td>14 April</td>
<td>11</td>
<td>Social Studio Challenge Presentation</td>
<td></td>
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<tr>
<td>15 April</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 April</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 April</td>
<td>14</td>
<td>Prototype drawings ready</td>
<td></td>
</tr>
<tr>
<td>5 May</td>
<td>15</td>
<td>NO CLASS - Away</td>
<td></td>
</tr>
<tr>
<td>12 May</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 May</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 May</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 June</td>
<td>19</td>
<td>Swast vacation – no classes</td>
<td></td>
</tr>
<tr>
<td>9 June</td>
<td>20</td>
<td>End of Semester Review Presentations</td>
<td></td>
</tr>
<tr>
<td>16 June</td>
<td>21</td>
<td>All staff walk and talk forum</td>
<td></td>
</tr>
</tbody>
</table>

NO FIXED ADDRESS – studio tutorial guide  

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Appendix 9. Cycle Futures Studio Poster

CycleFuturesLAB: designing for after the auto-dis-economy
Tutors: Liam Fennessy & Dr Scott Mayson
GRAP 1035: Design in the Research Context + GRAP 2294: Industrial Design Studio Specialisation
Semester Two 2014

Given Australians buy more new bicycles than they do cars what if Melbourne redirected its car parts manufacturing capabilities towards innovation in the cycling product/service ecosystem?

Auto parts manufacture in Melbourne has been the mainstay of the local manufacturing sector for the best part of a century and is now at a critical crossroads: car making as we know it will cease by 2017.

The auto parts manufacturing supply chain have to either rapidly establish new markets for their specialised capabilities, close up shop, or radically re-position their production towards new types of products for other markets. For those industries and employees that require volumetric manufacturing using existing plant and equipment and ready markets to maintain their jobs in the near term placing faith in “the market”, or the prospect of “advanced manufacturing” and “diversification” as solutions is deeply problematic. However, this rupture in the auto-dis-economy presents a very real opening for design to redirect the radical monopoly of car making/selling/buying/using through proposing strategies for a more resilient manufacturing future.

This studio uses a variety of design research methods to explore:

- How current auto-parts manufacturing enterprises might be re-made as cycle-parts manufacturers
- What the diverse social, environmental and technological conditions of Melbourne offer for product innovation for global cycle markets
- How design thinking can be used to maximise the application of existing manufacturing infrastructures and to identify opportunities for new investments
- How to connect design thinking to broader demographic, psychographic, service provision, advocacy agendas and policy shifts
- The development of robust design propositions as working prototypes
- New ways of doing design innovation to disrupt existing trends and attitudes and to make new markets
Appendix.10. Terminology for Sociotranseunt Practice.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breach</td>
<td>A breach is the moment where an implication in a Defined Context of Concern is mediated through the introduction of new things and systems.</td>
</tr>
<tr>
<td>Concerns</td>
<td>Problems that manifest as implications in a sociotechnical context.</td>
</tr>
<tr>
<td>Defined Context of Concern</td>
<td>A specific location with a set of actors, framed by an implication, that design enters into and is activated.</td>
</tr>
<tr>
<td>Intermediary maintenance</td>
<td>The maintaining of a sociotechnical practice undertaken by its actors (people, things and systems).</td>
</tr>
<tr>
<td>Internal redundancy</td>
<td>The duplication or proliferation of intermediary things and systems to keep a sociotechnical practice stable.</td>
</tr>
<tr>
<td>Mediatory Actors</td>
<td>Actors (Human and Non-human) that have the greatest potential to disrupt and transform a sociotechnical practice</td>
</tr>
<tr>
<td>Migratory Interloping Actors</td>
<td>Actors that enter into a context and its sociotechnical practices either temporarily or without lasting effect.</td>
</tr>
<tr>
<td>Mediating things</td>
<td>Material and technological actors that mediate a sociotechnical practice towards transformation.</td>
</tr>
<tr>
<td>Implications</td>
<td>Implications are the translated concerns into sociotechnical practices and the projected outcomes of the continuation of those practices.</td>
</tr>
<tr>
<td>Sociotranseuncy</td>
<td>Sociotranseuncy relates to the being of or in a state of designerly thing-ing and system-ing within a defined context of concern.</td>
</tr>
<tr>
<td>Sociotranseuntitivity</td>
<td>Sociotranseuntitivity describes an inclination towards an activity of designerly thing-ing and system-ing.</td>
</tr>
<tr>
<td>Sociotranseunt circularity</td>
<td>Sociotranseunt circularity is when newly designed mediators that have transformed a sociotechnical practice produce other implications in the DCC that require continual re-thing-ing and re-system-ing.</td>
</tr>
<tr>
<td>Systems</td>
<td>Non-material actors such as services or technologically enabled communication.</td>
</tr>
<tr>
<td>System-ing</td>
<td>The process of designing non-material or service oriented mediators.</td>
</tr>
<tr>
<td>Transformative Agent</td>
<td>A Transformative Agent is a designer that enters a Defined Context of Concern to bring about change.</td>
</tr>
<tr>
<td>Transformative interlopers</td>
<td>Mediating Things and Systems that enter a Defined Context of Concern to bring and cause concerns to convert into implications.</td>
</tr>
<tr>
<td>Things</td>
<td>Material and technological actors. These could be seen as products.</td>
</tr>
<tr>
<td>Thing-ing</td>
<td>The process of designing material and technological mediators.</td>
</tr>
</tbody>
</table>