NOTE

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Project methods as the framework for undergraduate design education:

A systems-based study of congruence, commonality and variation

A thesis submitted in fulfillment of the requirements for the award of the degree

DOCTOR OF PHILOSOPHY

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by

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Abstract

Over recent years there has been much debate regarding the nature of undergraduate design education, but very little in the way of empirical research. The purpose of the research study reported in this thesis was to develop an empirically grounded explanation of undergraduate design education curriculum. Projects, traditionally used as the organising mechanism of the design curriculum, were the focus of the study. Taking into account the complex and situated nature of the curriculum, systems theory was used as the underlying conceptual framework for the study.

Based at a faculty of design in an Australian metropolitan university, a qualitative case study approach was taken to the research. This focused on a set of four unit of study cases and six project cases, including curriculum from graphic, digital media, product and interior design programs. Data were collected from a variety of sources within those cases, including program documents, observations of classes, learning and teaching documentation, and interviews with teachers.

A series of analyses of the curriculum were carried out, each using a distinct lens. First, the data were analysed for categorisation of components of the curriculum. Findings from this analysis were used to generate a systems-based curriculum model. This model was then used as an organising mechanism for the subsequent analyses. These iterations of analysis were used to identify, respectively: internal logic (congruence) among the components in each project case; common characteristics across the project cases, and; variation across the project cases.

Findings demonstrated that there was general congruence within the project cases, indicating an overall alignment of learning objectives, learning activities, resources, and assessment. There were also some areas of dissonance, including striking challenges with the articulation of key concepts and establishing a balance between student and teacher roles in relation to the projects. The analysis of commonalities resulted in a definition of projects in the design education context. In the final analysis, of variation between projects, distinct differences in scale, complexity and roles were found between the project cases. These differences formed the basis of a project methods typology.
The findings from this study constitute a significant contribution to the literature on design education practice and project methods. Of demonstrable significance to practitioners, the curriculum model and analysis of congruence provide guidance to teachers in the complexity of alignment issues in the development and enactment of curriculum. The definition of projects in this context substantially extends on the current literature on project methods, while the demonstration of similarities between the broader educational literature and design education provides a ‘bridging’ language, supporting greater cross-disciplinary educational debate and development. Finally, the typology provides a starting point for decision-making with regard to the selection of appropriate levels of projects for different learning purposes.
Acknowledgements and dedication

My path to, and through, education has been unconventional to say the least. As a late entrant to higher education, and in common with most professional designers of my educational generation, research was not part of the picture. I, therefore, must give my most heartfelt thanks to my supervisors, Professor John Bowden and Associate Professor Deirdre Barron, for their unrelenting belief in my capacity to carry out the research, and their ability to challenge my thinking. Their forbearance and skill in supervising my work has been the solid ground that has allowed me to explore the concepts and difficulties in this work and, at times, even to dance with them.

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Finally, I dedicate this work to my daughter, Grace, who can recall no time when I wasn’t working on my PhD, but who nonetheless has never failed to tell me that I’m doing really well.
Declaration

I, Nicolette Delphine Lee, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy from the Faculty of Design, Swinburne University of Technology, Melbourne, is completely my own work except where otherwise referenced or acknowledged.

This work has not been submitted for qualifications at any other academic institution.

Nicolette Delphine Lee

11th May 2011
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Chapter 1:  
Introduction

The study reported in this thesis was concerned with the nature of the project curriculum in undergraduate, practice-based design education. Practice-based design education was chosen as the focus of the research because of its centrality to key assumptions about the nature of design education, particularly studio-based learning and project outcomes (Green, 2005). This thesis therefore distinguishes practice-based design education as a particular entity, but also acknowledges the often varied nature of the undergraduate design education curriculum.

The study was approached as qualitative case study involving six project cases within three units of study (courses), and took place in a faculty of design in a metropolitan university in Australia. This chapter outlines the background and context of the thesis and introduces the rationale and purpose of the study. In doing this, the background and current status of the literature for design education and project methods are briefly discussed. Gaps in the literature are also described, demonstrating the significance of the study. The broad boundaries of the study are then outlined, including a brief introduction to the underpinning conceptual framework, questions, methods, and research process. Finally, the structure of the thesis is outlined, by reference to the chapters that follow.

Design education

Design education has its roots in the medieval guilds, master-apprentice systems and ateliers of European tradition, ‘brought forward through the artisan trades of the industrial revolution’ (Friedman, 2000, p. 15). Since the middle-ages, apprentice-style learning, in which the learner follows the instruction of a master and carrying out projects either in the workplace or in a studio, has prevailed. The art academies and ateliers of the 17th, 18th and 19th centuries formalised these traditional methods of teaching in the fine arts (Raleigh, 1964; Cross, 2001; McCoy, 1998). In the atelier system, students worked under the guidance of a master and ‘practiced [sic] increasingly complex projects’ or worked on parts of the master’s own professional projects in a simulacra of apprenticeship (McCoy, 1998, pp. 4-5). By the late 19th
In the early 20th century, the Staatliches Bauhaus at Weimar blended the atelier and apprentice models into a structured curriculum for architects and designers. In its short life the Bauhaus school became arguably the most significant influence on modern design curriculum and pedagogy (Cross, 2001). It has been described as both the first design school (Cheng & Liao, 2001), and as the ‘progenitor of the modern school of art’ (Raleigh, 1964). More recently, in both Britain and Australia, art schools and colleges have been largely brought under the banner of universities (Friedman, 2000; Naylor, 2009). In this context, tensions have arisen around the systematisation of curriculum, entry methods and resourcing of design programs, creating pressure on the traditional open-ended and project-based curriculum formats (Jackson, 2000; Gothe, 2000). The perceived incommensurability of traditional design education activities with university structures and the aims of university education has sparked debate in the field around the purpose of design education, its curriculum and teaching practices, and their relevance to the design professions and the university context (Cross, 2001; Dilnot, 2000; Frascara, 2007; Friedman, 2000; Jackson, 2000).

While these debates have tended to focus on the syllabus and teaching quality in undergraduate design education, and the format of doctoral education in design, little has been done in the way of empirical research regarding the design curriculum (with a few notable exceptions, for example, Davies, 1998; Davies & Reid, 2000; Green, 2005; Pearson, et al., 1999). Hickman (2008, p. 11) argues that there is a ‘dearth of rigorous in-depth research and in particular a lack of empirical studies’ in design education, and that most of the published work is ‘small scale’, ‘largely theoretical’, and ‘best described as ‘informed musings’. More specifically, as will be seen, despite the ubiquity of assumptions regarding projects as the organising feature of design education, there has been very little empirical research addressing the project curriculum.

Projects in design education

Although projects are widely agreed to be the fundamental organising structure through which practice-based design education occurs (Clews, 2003; Davies, 2002; Davies & Reid, 2000; Knoll, 1997; Pearson, Barlowe, & Price, 1999; Thompson,
writers in the design education literature have tended to treat the project curriculum as synonymous with design education, rather than an object of interest (see, for example, Ashton, 2000; Chipps, 2007; McCoy, 1998). There is also a largely unquestioned assumption in the literature that there is shared, singular, meaning for the term (see, for example, Ashton, 2000; Bakarman, 2000; McCoy, 1998; Penaluna, 2007). Where projects are explicitly described in the literature, these tend to be particular cases of innovations in curricula process rather than empirical research regarding the curriculum. For example, general descriptions of revised assessment processes in a project (Ehmann, 2005), changes to delivery models to include small group exercises (Smith, et al., 2009), the implementation of team-based projects (Clews, 2003; Ehmann, 2005), and reflective or process journals (Lawrie, 2004; McGilp & Stephen-Cran, 2007; Wingham, 2007). Other writers have discussed the uses of web-based learning tools (Clews, 2003; Craig & Zimring, 2000; Lou & MacGregor, 2004), and the challenges and benefits of students undertaking live projects for clients (Chipps, 2007; Longden-Thurgood, Penty, & Roberts, 2007). Studies have also focused on the evaluation of learning in relation to particular interventions (see, for example, Smith, et al., 2009), emotional aspects of design learning (Austerlits & Aravot, 2002), or student and teacher conceptions of design (Davies, 2002; Davies & Reid, 2000; Newstetter, 2001).

The lack of contextual research around project methods in design education was a driving factor in this study. Newstetter et al (2001) also express disappointment with the lack of thorough empirical studies in design education. In particular, they note that in a call for research papers on design education practice, there was a lack of research grounded in the broader educational theory. One of the reasons for this lack of engagement, suggested by Caban and Wilson (2002), is that generic educational theory is only minimally applicable in design education. They argue that the learning styles of design students, and the design education process, are unique. Nigel Cross (2004, p. 427) echoes this position in his review of research on designer behaviour, in which he argues that ‘expertise in design has some aspects that are significantly different from expertise in other fields’. In Cross’ view, ‘in design education, we must therefore be very wary about importing models of behaviour from other fields’ (p. 440).

In contrast, Jones (2006) suggests that generic educational research has much to offer design education, and that common themes can be found in ideas of professional and adult learning. This view is also echoed by several writers who have
drawn on the educational literature in their studies in design education (see, for example, Davies, 2002; Ehmann, 2005; Blair, 2006b). Given the ubiquity of references to projects as the organising feature of design education in the literature, the notion of project-orientation provides one such potential area of commonality. In particular, it seemed to me that in order to develop the debate around the design education curriculum and pedagogical practices, baseline empirical research was needed to clarify the structures and events that form the design education process in the university setting. The view that the literature on project methods in education has relevance for design education is, therefore, the view taken up in this thesis.

**Project methods**

The development of project-based learning, or the project method, in formal education is generally agreed to have occurred over the first decades of the 20th century. Stevenson’s (1921) account of the project method describes the earliest developments in project methods as taking place between 1908-1918, although he also notes the prior existence of the method in architectural education and ‘in business and some specialised forms of education with a rather vague meaning’ (p. 40). In general historical accounts of the method, it is argued that the project method spread from popular use in American schools during the 1920s, to Britain and other countries during the 1930s (Adderley et al., 1975).

Two major figures in the ‘Active Movement’ in education have been linked to the project method: John Dewey and William Kilpatrick. Dewey’s contribution to educational theory has been widely cited. A leading exponent of the pragmatist school of philosophy, Dewey’s reaction against didactic teaching methods and the inefficacy of rote learning spawned a number of works on education, including his books on the topic, ‘How We Think’ (1910, 1933), ‘Democracy and Education’ (1916) and ‘Experience and Education’ (1938). Synthesising the work of previous educational theorists and philosophers, including Aquinas and Rousseau, he argued that learners needed opportunities to practise the application of knowledge alongside its abstract acquisition. Effective learning, according to Dewey (1916, p. 283), occurred through active and direct experience: ‘Men have to do something to the things when they wish to find out something; they have to alter conditions. This is the lesson of the laboratory method, and the lesson which all education has to learn’.
Dewey advocated a ‘problem method’ which Adderley et al (1975, p. 7) describe as owing ‘much to conventional scientific methodology, involving as it did a sequence of operations which included the identification of a problem, the internal dramatisation of solutions, the formulation of hypotheses, and the selection and application of the optimum solution’. The problem method advocated by Dewey shares some characteristics with the project and problem-based learning approaches in wide use today, but is not synonymous with them.

Drawing on Dewey, Kilpatrick (1918, p. 1) argued that the project method is based on a ‘wholehearted purposeful activity proceeding in a social environment’. According to Kilpatrick, central to the original project method is wholehearted experience: any instance of purposeful activity where the dominating purpose is the achievement of a natural goal, which fixes the aim of action; allows for the satisfaction of achieving, or annoyance at not achieving, those aims; and leads to change. Key to Kilpatrick’s thinking were the concepts of interest and effort, brought about by interaction with the environment and the identification of a need or want. Other writers, such as Gull (1933, p. 13), equally praised the project method:

‘The project method is Nature’s own method of education; it is the means whereby all civilization has come about, and so great is its power that every educational method contains something of its principles … The project method is … the fundamental method for human beings’

At a broad level the descriptions in the literature provide a fairly consistent view of the project method as one that is profoundly active, experiential and authentic (Adderley, et al., 1975; Helle, et al., 2006; Mergendoller, Markham, Ravitz, & Larmer, 2006; Mills & Tregust, 2003; Thomas, 2000). Helle et al (2006) argue that the general characteristics of projects in education have remained as described by Adderley et al (1975, p. 1) as:

(1) They involve the solution of a problem; often, though not necessarily, set by the student himself.

(2) They involve initiative by the student or group of students, and necessitate a variety of educational activities.

(3) They commonly result in an end product.

(4) Work often goes on for a considerable length of time.
(5) Teaching staff are involved in an advisory, rather than authoritarian, role at any or all of the stages – initiation, conduct and conclusion.

Projects are also described as being close to professional reality (Mills & Treagust, 2003), as providing opportunities for depth and high levels of engagement, and a flexibility of topic and pace to match learner interests, strengths and weaknesses (Barron, et al., 1998; Moursund, Bielefeldt, & Underwood, 1997). Other authors have described the teacher’s role as facilitators, providing guidance, resources and scaffolding activities to support student progress (Adderley, et al., 1975; Barron, et al., 1998; Blumenfeld, et al., 1991; Stefani, Tariq, Heylings, & Butcher, 1997). In line with this expectation, students are generally required to take ownership of their work (Adderley, et al., 1975; Mergendoller, et al., 2006; Thomas, 2000). Many authors argue that these characteristics of project methods fulfil the criteria for a constructivist approach to learning. That is, the learner is made central to the process of learning, and is able to draw on their own experiences, interests and abilities to define the shape of the work (Gulbahar & Tinmaz, 2006). Similarly, a number of authors argue that project methods encourage deep learning (Adderley, et al., 1975; Barron, et al., 1998; Gulbahar & Tinmaz, 2006; Mergendoller, et al., 2006; Parry, Reynoldson, & Pospisil, 2002).

Nonetheless, there is a paucity of theoretical literature laying the groundwork for understanding the way projects are incorporated into various learning contexts (Helle, Tynjala, & Olkinuora, 2006). Demonstrating this point, Helle et al (2006, p. 306) note that in the literature on project methods, studies are often ‘poorly conceptualised’ and lacking in both theoretical grounding and practical detail. Thomas (2000, p. 36) also indicates that there is a lack of grounded practical information for the educator and that:

… what seems to be needed is nothing short of a new theory of learning and instruction, a theory that will provide, on the one hand, principles for guiding authentic inquiry, knowledge construction (vs. transmission), and autonomous learning for students, and, on the other hand, models for designing efficient and productive (standards-based) projects, shifting responsibility to the learner, coaching without directing, and conducting performance-based assessment for teachers.
Dohn and Wagner (1999) further suggest that future research in project methods could accomplish a coherent theoretical understanding by examining the underlying educational principles and structural qualities of the project learning process and its variations of use. This suggestion underpins the aim of the study reported in this thesis. In particular, the focus on the curriculum and its characterisation as a complex system.

Curriculum as a system

Any serious inquiry into enhancing design curricula must offer a systematic overview of the many issues involved in curriculum development for design. (Friedman, 2006, p. 28)

Although there is a substantial amount of research in the learning sciences, several authors argue that there has been little research focused on curriculum (Barnett, Parry, & Coate, 2001; Hicks, 2007). In part, this can be explained by the variety of ways the term is used. While the term is often used interchangeably with ‘program’ (see, for example Dearing, 1997), two common uses of the term curriculum were identified in the literature. The first of these is as a category for types of educational content or syllabus (Barnett, et al., 2001; Biggs, 1999; Jarvis, Holford, & Griffin, 2003). The second use includes the structure of programs including teaching methods, content, learning activities and assessment and influenced by a wide range of environmental factors including the cultural, social and institutional context, and the views of the people involved in curriculum development and delivery (Hicks, 2007; Print, 1987; Smith & Lovat, 1991; Tight, 1996). The second, broader, definition is more commonly used in the curriculum literature, and was taken up in this study.

In this thesis curriculum is further conceptualised as an education system composed of interdependent components, that extend across organisational, syllabus and pedagogical factors. This mode of thinking is drawn from systems theory, sometimes characterised as a systems approach. Systems theory does not represent a substantive theory in itself, but rather a ‘conceptual framework in which any number of different substantive theories of social organisation can be constructed’ (Olsen, 1978, p. 228). It is not concerned with the ‘constant attributes’ of a single object of study, but with multiple parts, interactions, interdependencies and contextualisation as part of a wider environment (Gharajedaghi, 2006; Katz & Kahn, 1966). Systems theory thus provides a conceptual structure for abstracting and understanding
problems of structures, relationships and interdependence, rather than the constant attributes of an object (Balantine, 2001; Chen & Stroup, 1993; Flint, 1997; Hong, Al-Khatib, Magagna, McLoughlin, & Coe, 2006; Katz & Kahn, 1966).

In more practical terms, taking a systems approach to inquiry involves the development of system models – diagrammatic representations of a phenomenon - that form the containers for data. Systems models allow researchers to organise data about the parts of any setting, without the immediate imposition of judgement about how the system operates or why it operates as it does (Balantine, 2001). System models are thus an effective tool for understanding complex situations and phenomena, where there is a desire to look at the situation holistically.

Systems models have long been used in education as a way of explaining the behaviour of educational systems (Biggs, 1999; Dunkin & Biddle, 1974; Frick & Thompson, 2004, Ratcliff, 1996b). The advantage of such an approach to an educational study is the promotion of coherence of theoretical development and the avoidance of simplistic cause and effect scenarios (Biggs, 1999; Chicago Public Schools, 2002; Hong, et al. 2006; Newmann, Smith, Allensworth, & Bryk, 2001). Several systems-based educational models were found in the literature. The most well-known of these were Dunkin & Biddle’s (1974) ‘model for the study of classroom teaching’, and Biggs’ (1999) 3P model. The relevance of, and issues with, these models in relation to the current study are described in some detail in Chapter 3 of this thesis.

**Research purpose and methods**

As outlined in the sections above, there is a dearth of literature regarding the nature of the project curriculum in design education. Empirical research in this area would provide a great deal of value to the field and to practitioners, who hitherto have been reliant on the anecdotal and very general assertions about the nature of design education curriculum. In the university context, for example, design academics are often required to justify their practices, to report on teaching for quality assurance purposes, and to undertake academic development programs aimed at improving learning and teaching institution-wide. From the perspective of the day-to-day work of the design academic, these programs often do not take account of the specific needs of design programs. Further, developing educational practice and documenting
curriculum in such a way as to engage with the wider university community can seem highly problematic. Design educators have little access to language that allows them to respond to contemporary challenges in the university environment, or to present arguments that link design education practice with the broader educational theory. There is also insufficient evidence or knowledge of the details of design education practice for design educators to critically develop their own practice.

Such a study would also provide further elaboration of project delivery that informs the wider field on project methods. Consequently, this study was designed to gain an empirical foundation for understanding the structure and components of the project curriculum in undergraduate practice-based design education.

The initial aims for this PhD study were, therefore, to:

- Identify a language that connects design educators to mainstream research in education
- Explore the structure, components and processes of design education curriculum
- Produce a framework that may assist design educators in the critical development of their own teaching practice

Working within the boundaries of undergraduate design education, the primary question in this study was:

- How might project curriculum be described?

In order to address this question, and using a systems approach as the guiding framework, several further questions were raised:

- What interacting variables are observable? How might they be mapped to provide a cohesive model?
- How do these variables relate to one another? How might internal coherence be evaluated?
- Are there commonalities among projects? If so, are these sufficient to provide a definition of projects in the undergraduate design context?
• Do projects differ? If so, how do they differ from one another?

The study took place in a faculty of design at a metropolitan university of technology. The faculty is home to undergraduate programs in graphic design, digital media design, interior design and product design. Further programs are shared with other faculties and discipline groups in the form of double or cross-discipline degrees. The boundaries of the study excluded these shared or double degrees and related programs. The set of programs studied for this thesis have a mix of theoretical, technical and design components, but with a strong focus on professional design practice. In this context, ‘program’ refers to the overall course of study leading to a degree qualification, typically over a three or four year period. ‘Unit’ is the descriptor for discrete modules or courses of study within the degree programs. Students typically study four units concurrently, in a two semester per year pattern of enrolment. Within units, there can be one or several projects, defined by specific tasks leading to an assessable outcome.

The research questions required a balance of breadth and depth in the study method, and a situated understanding of the curriculum. Grounded, qualitative, case-based research methods were selected as the most appropriate means of understanding both the overall structure of the curriculum and details of its implementation. A wide range of data sources were utilised for this purpose, including documents, interviews and observations. This approach was selected as the most likely to provide a holistic picture of project curriculum, and to take account of the context in which the curriculum operates.

The research commenced with collection of documentation from across the programs and detailed data collection from three purposively selected unit cases, comprising six project cases. The analysis of this data was used to develop a working curriculum model. This model provided the organising structure for the in-depth analysis of the unit and project cases. The further analysis of the units and projects was carried out using three distinct lenses in relation to the research questions: internal logic (congruence) within each case, the common features across the cases, and variations across the cases. The overall process, therefore, involved four layers of analysis. These were carried out in iterations of refinement and often overlapped, but for the sake of readability in this thesis are presented in a linear fashion. In summary, the layers of analysis were:
• Analysis of the data to model categories and variables as ‘containers’ for data, thereby describing the components of the curriculum;

• Analysis of the congruence of variables within each case, thereby explaining the internal logic of each case;

• Thematic analysis of the variations in the data across the variables, thereby describing the differences between projects;

• Thematic analysis of the commonalities in the data across the variables, thereby describing the key features of projects.

Thesis overview

Chapter 1: Introduction has introduced some of the issues facing contemporary design education practice in universities, the premise that projects form the most common organising feature of undergraduate design education, the limits of the existing literature, and the significance of this study. The chapter has also provided the reader with an introduction to systems approaches as a general conceptual framework, along with the research purpose and methods employed in the current study.

The subsequent chapters of this thesis present the details of the methodology, cases, analyses and findings from the study. Typically, chapter two would comprise a literature review, setting the scene for descriptions of the data collection, analysis and findings. In this study, however, the disparate nature of the literature sources and topics informing the analyses presented a challenge in structuring the thesis along traditional lines. In particular, attempts to order the thesis with a single literature review chapter presented a disjointed picture of the key concepts relevant to the analyses. In the final drafting, therefore, the literature was embedded within each chapter as it became most salient. Although there was much re-drafting and worrying over this approach, the benefits outweighed the complexity of this structure. In particular, that in this way, the relevant literature is closely coupled with, and forms the critical boundaries for, the analyses and the arguments presented. In consequence, the structure of the remainder of this thesis unfolds as:
**Chapter 2: Methodology**, provides the introduction to the approach taken to this study and reviews the use of qualitative methods in educational research. This chapter also provides background on the selection of case study and grounded methods as an appropriate ‘fit’ for the study and the data, and describes the cases and processes followed, including a description of the data sources and analysis processes employed. **Chapter 3: Educational systems** introduces systems approaches in the educational context and reviews the literature regarding existing educational system models. The curriculum model developed from the study data in the current study is then presented. This model provides the framework for the subsequent chapters of the thesis, particularly the analysis chapters. **Chapter 4: Case descriptions**, provides descriptions of each of the unit and project cases and sets the scene for the analyses that follow in Chapters five, six and seven. **Chapter 5: Analysis of congruence within cases**, introduces the existing literature regarding means of evaluating the congruence of curriculum. In particular, Webb’s (1997) criteria for evaluation, and their adaptation for this study are presented. This is followed by the analysis of congruence for each of the project cases and an overview of the common alignment issues found across the cases. **Chapter 6: Analysis of common characteristics across cases**, commences with a review of the existing definitions of project methods found in the educational literature. The analysis of commonalities of the project cases is then presented and explored in relation to issues raised in the literature, leading to the presentation of a summary definition of project methods in the undergraduate design education context. **Chapter 7: Analysis of variation across cases**, commences with a review of the existing categorisations of project types found in the literature, along with analysis of their applicability to the project cases in the current study. The project cases are then analysed, building on the prior analysis of congruence and commonalities, to identify variations between the projects, and consequently, a propositional project typology. Finally, **Chapter 8: Conclusions and implications**, provides a summary of the achievement of the research aims and the significance of the thesis. The contribution to the literature in relation to the curriculum model, analysis of congruence, definition of the common characteristics of projects, and the project typology are described. The significance and implications of the research for practitioners is then outlined, along with the implications for future research.
Chapter 2: Methodology

In the previous chapter, the overall purpose and aims of the study were outlined, along with a summary of the methodological approach. The broad boundaries of the study, and the need for a holistic and situated approach to study design were noted. The use of qualitative methods and a wide range of data sources as the basis for gaining an understanding of the complex phenomena of the curriculum were briefly described. This chapter presents an explanation of the underpinning epistemological and methodological perspectives and concerns that guided the research design, and a description of the consequent decisions regarding methods, data sources and analyses.

Ontological and epistemological positions

The ontological, epistemological and methodological positions taken by researchers represent particular ways of seeing the world, and of understanding the nature of reality and knowledge, as well as their relationship with it (Guba & Lincoln, 1994; Lincoln & Guba, 2000). Ontology is the way of seeing reality, that is, the existence of an external, observable and stable reality, as opposed to a reality composed of human perceptions. Epistemology is the set of beliefs regarding the nature of knowledge, what can be known, and the degree to which knowledge is collective or shared. These ways of seeing guide the kinds of research undertaken, the methods used, and the types of interpretations that are made (Denzin, 2002). While the use of terms is inconsistent across the literature, and over recent years there have been increasing overlaps between positions (Miles & Huberman, 1994), an attempt is made below to briefly sketch out the features of the major positions, with some of the associated implications for research focus and methodology.

Positivist perspectives identify the world as an objective reality, leading to an epistemological position that the world is knowable through logically and empirically derived fundamental laws, rules or principles. Research associated with this position draws from this basis a number of assumptions about how knowledge is obtained and what claims may be made. These assumptions define what is valued and the criteria for judgement about research topics, processes and outcomes (Bassey, 1999;
Cohen & Manion, 1994). Hypothesis-driven and experimental research provides the means for testing theories, and quantitative methods the generalisation needed to create law-like principles.

In the positivist tradition two major criteria define the value of research: validity and reliability. Validity is based on the internal consistency of the theory on which the research is based, and the coherence of the research within that theory. Reliability is concerned primarily with the reproducibility of experimental outcomes. The isolation of phenomena from context and influence of the researcher are considered crucial for ensuring that research is reliable and reproducible by multiple researchers in any context. The associated deductive reasoning process aims to test existing theories through empirical study, often across large samples. As a result of this process, linear cause and effect proofs and generalisation, whether to the subject group under study or to a wider group, are desirable outcomes for positivist research (Cohen & Manion, 1994). Educational research in an orthodox positivist paradigm, it follows, is focused on quantification, measurement and testing of hypotheses. Many studies on the efficacy of project methods are based on this underlying philosophy. Those studies seek to measure effectiveness by direct comparison with non-project delivery of the same topics, and to measure this with quantifiable outcomes such as test results (Adderley, et al., 1975).

The post-positivist ontological perspective does not assume a perfectly knowable reality. The seeds of this thinking can be seen in the philosophical argument presented by Kant in his Critique of Pure Reason (1787). Kant argued that claims to certain knowledge of an external truth – the ‘world in itself’ - are based on an illusion, and the pursuit of unconditional knowledge is therefore doomed to failure (Scruton, 1982). Regardless, his argument was for the acknowledgement of an external reality, but one essentially unknowable in and of itself. In other words, all humans understand only through intellectual and physical perception, and this perception is necessarily coloured by social, cultural and intellectual limitations, contexts and language (Hamilton, 1998).

From a post-positivist perspective generalisation of findings is sought but these are considered probable rather than absolute. This methodological concern with generalisation further implies that while qualitative methods are not excluded as a means of data gathering in a post-positivist paradigm, qualitative research methods are useful only as a means of developing descriptive labels. For example, the
research on deep and surface learning approaches tends to use qualitative approaches to define learner characteristics, followed by quantitative approaches to allow for prediction and generalisation (Bassey, 1999).

A related position described by Miles and Huberman (1994) is that of the transcendental realist. This is the ‘nondualist position’ described by Marton and Booth (1996, p. 537), in which “there is only one world, a real existing world that is experienced and understood in different ways by human beings; it is both objective and subjective at the same time. An experience is now a relationship between object and subject that encompasses them both’. The core position advanced considers that ‘social phenomena exist not only in the mind but also in the objective world – and that some lawful and reasonably stable relationships are to be found among them’ (Miles & Huberman, 1994, p. 4). This is similar in some respects to the post-positivist position, but does not lead to the privileging of generalisation or quantitative methods to the same degree. Methodological approaches that have been associated with this position include Grounded Theory and Phenomenography (Richardson, 1999), and in particular, qualitative methods of data collection.

Although ontologically engaging in a kind of ‘historical realism’ (Lincoln & Guba, 2000, p. 168) the critical theory perspective is concerned with the cultural, political or social forces that shape and reproduce particular kinds of knowledge, and more specifically, reinforce existing power structures. Epistemologically, critical theory not only takes knowledge as value-laden, but also as culturally and socially shaped with inherent inequities arising from power structures. Notions of power, control and social justice, ideas that can be seen in feminist, socialist and culturally centred philosophies, are privileged in the critical theory paradigm.

For the critical theorist, therefore, research is often based on inclusive strategies with a strong emphasis on participant empowerment, but is nonetheless predicated on a universalism of the central problem of social value systems. Research in education from the critical theory perspective may be concerned, for example, with the reproduction of cultural norms through education, or issues of exclusion and power for particular social groups. The aim of such research is transformation through informed empowerment (Lincoln & Guba, 2000).

Participatory approaches share some features with critical theory research, specifically the preference for participant empowerment. However, there are
important differences. Participatory approaches do not have the driving agenda of historical realism (Denzin & Lincoln, 1998; Lincoln & Guba, 2000). According to Lincoln and Guba (2000), participatory perspectives come from an epistemological position of co-creation that privileges practical and tacit knowledge. Language is negotiated as part of a community of practice, and ultimately focused on personal experience.

The constructivist position (Guba & Lincoln, 1994) places both ontology and epistemology in a framework of individual subjectivity rather than an externally knowable reality (Green, 2002). Individual experience and understanding, meaning and theories generated from direct experiences and the messiness of the experienced world are thereby privileged over any desire for universality or causal explanation (Cohen & Manion, 1994). The central position could be summarised as an understanding that social contexts and individual interpretations are the foundation of knowledge. It follows that rather than starting from singular theoretical positions that lay claim to knowledge of the world ‘in itself’ and thereby to defining direct causal relationships, constructivist inquiry begins with everyday experience. This takes into account the complexity, values and meanings ascribed to phenomena as they are enacted, and in real world contexts (Green, 2002). This applies not only to the subject of study, but also to the interpretations and biases of the investigator (Hamilton, 1998). Rather than interpretive variation invalidating findings, it is regarded as a constant and unavoidable consequence of all inquiry (Lincoln & Guba, 1985).

The problem that I intended to address in this study was the lack of a conceptual framework or terms of reference for design curriculum that could contribute to current debate in design education, while affording practitioners a means of conceiving their tacit knowledge as part of a wider educational discourse. Specifically to identify the events, structures and actions that comprise the curriculum in undergraduate design education. The primary objectives were to thereby deepen understanding of undergraduate design education practices in context, and to develop a coherent propositional framework in order to provide design educators with a model for both developing and contributing their practice to the wider educational community.

The ontological position reflects transcendental realism, in that the question itself assumes that there are structures and events that are knowable, but that both the participants and the researcher interpret and ascribe distinct meanings to these.
Methods

While any combination of methods may be used for educational studies of this nature, quantitative approaches alone do not allow for the contextual or interactive benefits of qualitative methods (Guba & Lincoln, 1994; Thorne, Reimer Kirkham, & O'Flynn-Magee, 2004). Studies tend to employ qualitative or mixed data collection methods, and to begin from the perceptions and experiences of the participants or from observed phenomena as they occur in situ, working iteratively toward plausible explanations and theories. Miles and Huberman (1994, p. 6) describe qualitative studies as having several common features. In particular, that they are designed to gain a ‘holistic overview of the context under study: its logic, its arrangements, its explicit and implicit rules’. Further, qualitative studies are focused on everyday events and are a means of describing how people ‘manage their day-to-day situations’. The results of these studies are interpretive and thus tentative in their claims to wider applicability, but nonetheless provide rich information about the phenomena and cultures that are represented.

Given my own preference for educational inquiry grounded in practice, qualitative methodological approaches emanating from a naturalistic perspective were appropriate to the aims of the project and the values I would bring to the process as a researcher. In addition, an investigation into the detail of curriculum design and enactment suggested the importance of a contextual study of multiple dimensions within a small sample. These parameters were commensurate with the position taken by Lincoln and Guba (1985). They also suggested that case study inquiry would be an appropriate framework in which to develop a deeper understanding of practice.

Case study inquiry

Case study inquiry is fundamentally concerned with events as they are found in their natural setting. This reflects the naturalistic position that events, and constructions of knowledge of those events, cannot be divorced from the situation in which they occur in day-to-day life and their meaning in that context. According to Simons (1996, p. 225) ‘by focusing in depth and from a holistic perspective, a case study can generate both unique and universal understandings’. Case studies are also favoured for their ability to capture the complexity of practice, and to ‘render the unfamiliar familiar and the familiar strange’ (p. 231). In addition, case studies derived from the naturalistic
Project methods as the framework for undergraduate design education

inquiry perspective favour research design that emerges as the study progresses and the researcher becomes more familiar with the environment, working hypotheses and propositions that are grounded in the data collection over the study life-cycle (Lincoln & Guba, 1985; Miles & Huberman, 1994).

Merriam (1998) attributes a range of particular characteristics to the case study approach: preference for process over outcome; discovery over confirmation; depth and intensive description over breadth; and acknowledgement of external forces. Robson (1993, p5) describes case studies as ‘a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence’. Yin (1993) describes three general types of case study in reference to their intent: exploratory, descriptive and explanatory. The exploratory model is used as an early discovery process to establish characteristics of a situation for further study. The descriptive mode follows the exploratory and deepens investigation to provide the thick description characteristically required for case study reporting. Explanatory studies are described as capable of providing causal explanations for the data, and are therefore problematic from a naturalistic inquiry perspective.

Within these types of case study research, there are also dimensions of approach. Stenhouse (1985) describes four major orientations: ethnographic, evaluative, action research and educational. Ethnographic case studies are described as focusing on the conceptualisations of the participants, with interpretive descriptions of the patterns that emerge from these conceptualisations. Evaluative case studies aim to establish a critical judgement about the efficacy or otherwise of activities within a case, while action research case studies complete the cycle started by evaluation, through implementing change and re-evaluating those activities. Educational case studies are concerned with ‘understanding of educational action’ (p. 50), and according to Stenhouse, provide an avenue for the enrichment of educational discourse through systematic study.

Bassey (1999) concurs with Stenhouse’s definition of educational case studies, but extends the goal of understanding to that of practical application. In Bassey’s words, educational research is ‘critical inquiry aimed at informing educational judgements and decisions in order to improve educational action’ (p. 39). This definition is set apart from the kind of research into education through the lens of sociologists, anthropologists and psychologists. As described by Bassey, it is the kind of
educational research undertaken by educationalists. Bassey also adds an additional strand to Stenhouse’s case study categories: theoretical research. Bassey describes theoretical research as directed toward describing, interpreting or explaining. Unlike evaluative research, the aim is not to create change within the inquiry, but to ‘give theoretical accounts of the topic – perhaps of its structures, or processes, or relationships’ (p. 40). While Bassey goes on to indicate that the research begins with links to existing theoretical ideas, they are also theory-seeking studies. Bassey presents a case study of links between curriculum and classroom organisation as an example in which working hypotheses were developed through observations of classroom activity. Situated in a faculty, much of the curriculum unfolds in a combination of teacher direction during classroom events, student activities and assessment practices.

This study can be described as an educational, theoretical study. The aim of the research was not to create change during the study, but to identify the structures, events and processes of the curriculum. The study also incorporates the three types of study mode described by Yin. That is, exploratory, descriptive and explanatory. As noted above, exploratory studies provide entry points into areas where there is little previous research, or where a new approach is being taken. The paucity of literature in design education and project methods meant that in this study, an initial exploration of the curriculum features was necessary in order to establish the boundaries of the data prior to deeper analysis. This first process led to the development of the base curriculum model. The second part of the study was the descriptive phase, in which the more detailed data were collected and organised in the curriculum model, producing the descriptive accounts of the cases. The final stage sought to identify and generate hypotheses regarding the relationships between aspects of the curriculum.

**Defining boundaries in an educational case**

While case studies have been used for many different purposes, there are two major points of agreement in what constitutes a case study: the contextual or situated nature of a case, and that there is a distinguishable boundary between one instance and another. Defining the boundary of a case study in this context can seem deceptively easy. The naturalistic inquiry paradigm suggests that the researcher starts with an open mind and a problematic situation for which the boundaries may not yet be clear. Data are therefore collected broadly, and the constructs and
theoretical boundaries emerge within and from the data as analysis proceeds. Parameters must be set for the emergent process in order to contain the inquiry enough to carry it out. Ultimately, these are decided through a balance of researcher concerns, gathering sufficient data to allow for unexpected findings and remaining pragmatic about the manageable of the project (Bryce, 2002; Miles & Huberman, 1994).

In my study, the initial boundaries of the case were set around a broad concept of design education practice in a faculty of design. In the early stages of the process, I created multiple iterations of diagrams, attempting to find the boundaries for the study. The boundaries between phenomena were fiendishly difficult to manage - evidence related to the program, such as curriculum documents, teaching practices, and student activities appear to create a natural boundary. But how does one determine what not to investigate? If students carry out activities for the program outside of class, should they be observed? How does the program intersect with other programs? And should they also be studied? Should a study of curriculum as it is enacted in classroom settings also cover the effects of learning styles or teacher perspectives on the way curriculum unfolds? The questions that have potential influence on the object of interest in a research study are endless (Bryce, 2002).

Each of the questions raised above were questions recorded in my journals, and represented some of the most frustrating parts of the study process as I battled to make the scope manageable for a doctoral study. It was only as the project methods focus and my preference for explanation around the structural aspects of projects emerged that the boundaries also crystallised. The curriculum space became an important device for the bounding of the study conceptually. The boundary of this study was therefore set at the level of projects, with a focus on the curriculum structure. At the same time, I was also concerned that the study should not exclude the wider context in which projects occurred. As described in Chapter 3 of this thesis, the use of systems theory as a general framework provided structural support for the acknowledgement of contextual information without overwhelming me with data. The process of bounding the case was therefore inextricably intertwined with the process of data collection and the development of the curriculum model.
**Trustworthiness**

Qualitative case studies are not intended to provide proofs of external realities, nor to manipulate phenomena in a context-independent manner. The experimental or hypothesis-testing approach to validity is, therefore, inappropriate for judging the process and outcomes. There is instead an emphasis on the trustworthiness or credibility of the study. Generally, trustworthiness is enhanced through the use of rigorous and methodical approaches, aimed at ‘increasing the probability that credible findings will be produced’ (Lincoln & Guba, 1985, p. 301). Lincoln and Guba further argue that construction and representation of findings must be demonstrated as having come from logical progression through the inquiry, and that they are ‘credible to the constructors of the original multiple realities’ (1985, p. 296). In case studies, two issues are raised as being of particular importance: the need for prolonged engagement and the need for clear identification of the researcher stance in relation to the participants and the study. Specific data collection, reporting and review methods are also suggested to improve trustworthiness in case study inquiry. In particular, thick or detailed descriptions, external or member checks, and triangulation are used (Guba & Lincoln, 1994). In the following section these requirements are reviewed in relation to this study.

**Persistent observation and prolonged engagement**

In order to carry out the gradual process of sharpening of analysis, focused immersion over sufficient time to identify and explore, develop and consider alternatives in some depth is needed (Merriam, 1998; Miles & Huberman, 1994). Time spent in the context of the phenomena should also be sufficient to understand the culture, build trust between researcher and participants, and reduce the impact of being an interloper on the scene on both participant behaviour and researcher biases. This requirement raises some challenges for the researcher. In particular, the need for engagement with the case or cases over a substantial amount of time in order to gain sufficient understanding, and the need to establish a clear understanding of their own position in relation to the study.

My doctoral proposal was written mid-2005. The emergence of the major area of concentration and early empirical work can be identified in my journals and documents by the beginning of 2006. At the beginning of the study, I was employed in the faculty in which the research was undertaken. The working relationships with
colleagues were important to the study in that they created opportunities for ongoing discussions about curriculum issues in general and project methods in particular. This situation also raised two issues: perceptions of authority or relative expertise and the potential for ethical difficulties to arise around these perceptions; and the potential for difficulty in developing sufficient perspective on the faculty curriculum, arising from my immersion in the culture of the faculty. The ethical approval application* was constructed as much as possible to ensure that any participants were comfortable with the process and felt under no pressure to take part or to continue once the study had commenced. Although I had been very concerned that my position in the faculty would impact on how participants perceived my investigation, it was evident from conversations with participants that they saw it rather as an opportunity to share practice in what is usually an isolated activity. Throughout the empirical investigation, documents were volunteered, and on occasion during observations, teachers would engage me in their process to discuss strategies and ideas. However, some issues were raised around the recording methods to be used. I will return to this topic in the interviews section of the data collection methods.

The second issue, that of my own immersion, was treated as an explicit problematic in the inquiry process. From the earliest development of the research questions, I deliberately confronted the difficulties of stepping outside the accepted conceptualisations of design education. In particular, I felt it was important to overcome conceptual barriers presented by traditional descriptions of design education. As Simons (1996, unpaged) notes, there is a need for educational researchers to 'confront expectations and assumptions'. As the study progressed I became more confident in identifying the associated language and embedded belief systems expressed both in my own descriptions of design education and those of colleagues. By the time the empirical studies began the focus of the inquiry was concentrated on projects, and in particular, the structure of the project curriculum, necessitating a moving away from the language of studio into a broader educational perspective. As a graduate of a studio-based education, a design educator and a design professional, the concept of studio-based education, and the associated language, was more familiar to me as the basis for design education than that of

* The letter of ethical approval and table of key points (compared with actions) are provided as Appendix A to this document. The ethical application documents have not been included in this thesis in their entirety as they include explicit information regarding the location and participants of the study that by the same documents are protected. These documents are held by the Research Office of the awarding institution and are available for scrutiny by examiners.
projects. The challenge was to render this very familiar setting unfamiliar in order to see it anew. This challenge related to the researcher stance.

**The researcher stance**

The stance taken by the researcher toward the context and participants of a study has significance for the form and substance of the account. Herr and Anderson (2005) present a series of stances, described as a continuum of ‘positionality’, from insider to outsider. While their argument is specifically targeted to action research, the concern with the position of the researcher in relation to the participants and object of study is applicable to any study. Concepts of positionality have previously been used in case study research (Forrest, 2009). A contracted version of the continuum of positionality of the researcher is displayed in Table 1.

In addition to the position of the researcher as an insider or outsider, and the variety of relationships the research might develop with the participants or subject of study, there is also the position of insider as outsider (or outsider-within), which Herr and Anderson (2005) state is potentially problematic. They argue that an insider attempting to investigate from the position of outsider is making a false attempt to deny their own subjectivity, agendas and biases in the study. In a practitioner-researcher model that incorporates both colleague and researcher experiences in exploration of a particular phenomenon, I would argue that the researcher shifts constantly between external and internal positions in the study. The process requires that the researcher move from one perspective to another in order to gain some awareness of the contextual factors and individual perspectives that impact on activities, and to acknowledge their own subjectivity as distinct from those of others. This possibility is consistent with Herr and Anderson’s argument that action research dissertations should explicitly incorporate the perspective of the investigator as it changes through the experience, and as part of the reflective iterations of action research.
The position of the researcher in relation to the participants is primarily, but not only, influenced by the researcher’s context and choice of study. A range of potential points of shared experience, and differing perspectives, also affect the position of the researcher. The views of the participants too have some impact on the position that the researcher can take – by affecting what the researcher can access, and how ideas are presented. Perceptions of the researcher as an outsider with power can impact on positions taken by both the researcher and the participants.

While I conceive of my position as predominantly that of an insider and participant during the period of the study, my stance necessarily altered according to my professional position in relation to participants, the accumulated knowledge base in comparison with each participant, and the relationships as they developed during interpretation and efforts to clarify concepts. In some aspects of the study I was
deeply involved as an insider and collaborator, while in others I was at least in some respects an outsider or observer, rather than an insider/participant.

In this regard it is difficult to place my position neatly within one of the categories offered by Herr and Anderson. For example, as a teacher in the institution in which the study took place I shared many of the learning and teaching experiences of the faculty participants. The shared history was not only in teaching practice, but also in some of our common experiences as students of design, graduates and practitioners. We had also made similar choices with regard to moving from professional practice into academic life. I had developed working relationships with all of the participants, as well as with the faculty more generally. While I shared these aspects of the participant experience, others differed. For example, although I was a teacher in the same faculty as the participants of the study, I did not necessarily share their specific discipline, cultural or professional background. The distance afforded by this difference was useful in observing practice, but also added complexity to the relationships with participants. In acknowledging the divergence of perspectives, it is noted that even as an insider, I did not have direct access to the knowledge of the participants and remained the researcher in ways that superseded being an insider or participant.

The shared experiences and pre-existing relationships were both a hindrance and a benefit. I was able to talk with participants using common terms and shorthand for describing the faculty context, design education norms and traditions, and the broad range of constraining factors on teaching in this environment. The difficulty in such a situation is unravelling the shorthand meanings, bringing tacit understandings to the foreground, and in identifying the impact of participant perceptions of my role in relation to their own. I was also aware of the possibility of transferring perceptions from the review of my own unit to theirs, and of favouring my own practices either implicitly or explicitly. As an insider/outsider, the shorthand of design terminology had the potential to hide details of difference. However, as the study progressed, the theories in use and focus on project structures provided terms of reference that were both familiar to the participants and distinct from the commonly referenced areas of concern for design education.
External checking

Additional procedures involving a review of data and findings by external investigators, peers or participants ensure the reliability of the data and the analysis (Lincoln & Guba, 1985). These are often referred to in relation to referential adequacy. There are several means of achieving referential adequacy: auditing, member checks, and peer debriefings. The member checking process requires the investigator to review data, analysis and interpretations with participants in the study, or with members of the group from which the data were sourced. They may be informal or formal. Member checking may include reviewing notes on interviews with interviewees, sharing observational logs with others present, and sharing interpretations across participants or participant groups. (Lincoln & Guba, 1985). Accordingly, during each observation, notes were made available to the participant teacher, who was asked to verify their veracity. Teachers were invited to change or comment on any of the notes, and were also given the opportunity to clarify or remove any statements that they felt to be incorrect. During the interviews, the same procedure was used. Participants were able to see the notes during the interview, and at the conclusion of each interview they were asked to review the notes and to clarify concepts where they felt that this was appropriate. The recording of events and comments was therefore negotiated throughout the observation and interview processes.

Audits involve a second analyst reviewing data to establish whether the same conclusions can be reached. This process requires bracketing of a portion of the raw data of the study, which is left aside unanalysed. There are some difficulties with this process – in particular in choosing appropriate (representative) and affordable (not needed) data to archive. Clean data archives are not always achievable, nor appropriate. When undertaking negative case analysis, adequately completing the study requires the researcher to continue to seek negative cases. In itself this presents a paradox: the researcher must make the decision to forego either the exhaustive analysis or the availability of raw data for later review. In this study, documents, interview and observational notes were exhaustively reviewed in order to capture the full range of domains.

A further paradox is found in the use of a second analyst attending to the data at a step removed from the contextualised experience of the researcher, and the willingness of an outside analyst to focus on the concerns that drove the initial study.
Morse et al (2002) argue that such processes are not in themselves a test of validity as they do not capture the methodological coherence or investigator responsiveness characteristic of rigorous qualitative inquiry. Nonetheless, the case materials for this study have been archived, so that they are available for review at a later date. The archive includes data and process records, including: unit and program documents; teaching materials and example assessment items; records from observations and interviews; journals; the working conceptual documents; and development notes.

Peer debriefing takes the form of an interview in which a peer, acting as a ‘critical friend’ or ‘devil’s advocate’, probes for information regarding the process, assumptions, interpretations and conclusions of a study. The benefits of this process over the outsider audit is the capacity of insiders to identify the integrity of the handling of data, analysis and conclusions, and in a manner which is formative to the study, rather than external and ‘post-hoc’ (Morse, et al., 2002). Generally carried out at several points during a study, the debriefing is useful as a confirmation of working hypotheses. This process provides both auditing material and an opportunity for the investigator to test, defend and clarify their own thinking with an outsider to the study, but who also has sufficient expertise to push for elaboration and clarification (Lincoln & Guba, 1985). More informal peer review processes are suggested by Bassey (1999). In particular, he suggests that peer reviews can be ongoing discussions with colleagues or participants in the field. In the latter part of the study, the typology development was shared with colleagues, with the specific aim of identifying whether they felt that it adequately reflected the range of curriculum practices in which they were engaged, and whether the language and approach was felt to be credible. Their suggestions were incorporated into the iterations of refinement as the study progressed.

**Thick descriptions**

Lincoln and Guba (1985) acknowledge that it may not always be appropriate or achievable for external checking, particularly audits, to occur. It is not uncommon for those particular methods of ensuring validity of findings to be excluded from case studies, or for it to be replaced by the detailed description of case materials in the thesis itself as a ‘thick description’ (see, for example, Agostinho, 2006; Owens, 1982). The use of detailed case reporting provides three interrelated benefits: evidence that the account is credible, a vicarious experience of the case for the reader, and sufficiently detailed contextualisation to allow judgement to be made on the relevance
of findings for other contexts (Creswell & Miller, 2000; Guba & Lincoln, 1994; Stake, 2005). The large amounts of data typically recorded for cases, particularly where multiple qualitative methods have been used, provide a source of rich, holistic and vivid descriptions that are nested in context (Miles & Huberman, 1994). Lincoln and Guba (1985, p. 362) describe two components to the thick description of a case study:

- A thorough description of the context or setting within which the inquiry took place and with which the inquiry was concerned.

- A thorough description of the transactions or processes observed in that context that are relevant to the problem, evaluand, or policy option.

This study involved the use of multiple data sources (described below) and a persistent observation of curriculum enactment. The development of the curriculum model also took into account the institutional context in which the curriculum was situated, and to some degree, the prior experiences and perspectives of participants. These, in addition to program and project documents, observational notes and interview notes were compiled and summarised in both tabular and narrative form. Given that the study incorporated three unit cases and six project cases, the need to provide thick descriptions of each case had also to be balanced with the need for succinct and readable reporting, within the scope of the thesis. The case reporting method in this thesis is designed to provide sufficiently detailed descriptions of the context and features of each case, and in relation to each set of analyses, in order that the readers may make their own judgement about the applicability of findings to their own context. The narrative case descriptions are provided in Chapter 4 of this thesis. Summary descriptions of features relevant to the analysis, and important to their grounding in the data, are provided in the subsequent chapters.

**Triangulation**

Creswell and Miller (2000) describe triangulation as a method of seeking ‘convergence among … sources of information’, or for finding ‘common themes by eliminating overlapping areas’. In case study inquiry the term is specifically tied to the use of multiple sources and/or methods, and used to deepen understanding of phenomena that may only be superficially present in one data source (Stake, 2005; Yin, 1993). It can also be thought of as a means of gaining a holistic understanding of
the case, and is thus reflective of the context sensitive nature and the holistic, descriptive aims of case study inquiry (Merriam, 1998; Stake, 2005).

The primary purpose of utilising multiple sources and modes of collection in this study was to deepen and extend understanding, and to identify misunderstandings or conceptual gaps. The selection process was fundamentally directed by the need to gather as much material relating to the curriculum as was practicable, while avoiding overwhelming redundancy or extending the boundaries of the study to an unmanageable scale. In summary, the data sources were:

- Program documents from the faculty;
- Detailed unit outlines for all units delivered in the faculty;
- Observation records from three purposively chosen units;
- Project briefs, teaching materials and assessment documents from the observed units;
- Interviews with the teachers of the observed units;
- My own teaching records and experiences.

The selection and collection relating to each of these data sources is further elaborated in the following section.

**Data sources and case selection**

Data collection in case studies can take a wide range of forms. Merriam (1998) breaks these into three categories – document and artefact review, observations and interviews. In this study, all three of these collection methods were used, with the addition of review meetings with colleagues in order to test and extend understanding as the findings stabilised.

**Program documents**

In the initial stages, documents from university-based design programs were reviewed for common concepts and language. This was followed by collection of
program documents from the faculty, including information given to new staff, statements of direction, and descriptive documents used to explain the programs to prospective students. Unit outlines were then collected from every unit delivered in the faculty. The faculty holds program documents for a number of purposes. These include marketing statements for publication in print and web formats, internal communications, and reports from faculty and industry review panels. These documents were initially reviewed to get a broad sense of the direction and language used to describe the educational practices in the faculty. Unit outlines are required documents for every unit in the university, and are used for several purposes, including as working curriculum development documents, accreditation applications, program planning and moderation across classes, and communication to students about the nature and requirements of the unit. The unit outlines are based on a guideline document template, and include details of:

- Location, credit points, pre-requisite and co-requisite units, hours of contact;
- Aims and objectives;
- Teaching methods and learning activities;
- Topic content to be covered and recommended readings;
- Assessment items, including an approximate weighting;
- Policy and procedures regarding assessment, passing grades and appeals.

University requirements for program management mean that changes to the unit outlines need to go through an approvals process, in order to ensure coherence across programs and compliance with the overall program needs. Unit outlines are therefore relatively stable documents. At the beginning of the study, the faculty had a total of 73 discipline-specific and nine core units. All of the faculty unit outlines were analysed.

The next stage of data collection required closer investigation of a smaller number of cases in order to delve more deeply into the projects as they were structured in practice. Three units were chosen for this stage, one of them a unit in which I taught, as described below.
Unit cases

The next stage in the data collection process involved the purposive selection of cases. Cases may be positively chosen for a number of information-oriented reasons: extreme/deviant cases (identify the unusual to shed light on the usual); maximum variation cases (identifying factors unique to particular cases and/or contexts and selecting for the greatest range of features); critical cases (if it is true for this case then it is true for all cases); or typical cases (avoiding known variations that may skew the findings) (Flyvbjerg, 2006; Patton, 1980). Lincoln and Guba (1985) recommend maximum variation as the most appropriate sampling mode. While sampling choices may appear clear-cut, a case can be more than one type, revealing the potential for viewing it differently according to which perspective is used (Flyvbjerg, 2006).

In this study, units were selected on the basis that collectively they appeared to represent maximum variation. They varied in stage of program and discipline content, included group, professional context and sub-discipline variations. Further, they varied in relation to the number of projects delivered. In Case A, there was one project, in Case C, two projects, and in Case B, three projects. The units were also typical cases in that they were described in language typical of the units across the faculty. This represented potential for the greatest amount of information to be gained over a manageable set of observations (maximum variation), while having reasonable expectation of elaborating project types that would have wider applicability. Further criteria were that the teachers involved in the units should have at least five years teaching experience, be permanent academic members of staff in the faculty, had developed the curriculum for the unit, and were to teach it over the initial semester of the research study.

The rationale for the first two of these requirements was that these teachers would have sufficient experience in teaching to have well-established patterns of work and to be able to articulate their decision-making process. As permanent staff members, they would have knowledge of the norms, expectations and processes of curriculum development and delivery in the faculty context. In the faculty that was the context for this study, only permanent academic staff members develop curriculum, although contract teaching staff may deliver it. The requirement that teachers had both developed the curriculum and were to teach it reflected both a concern that teachers would be able to explain the reasoning behind particular curricula structures, and that they would be available as participants during the study period. These requirements
were not onerous – in the faculty it is typical for teachers to be responsible for curriculum development and teaching on a regular basis.

Following ethical approval, the teachers for two units were approached with a request for observation of class sessions and interviews. As noted above, the third unit was one in which I taught. In my case, I had not been involved in the development of the curriculum. Nonetheless, I felt that where my own unit was the subject of study this provided some advantages. In particular the experience of teaching into a structure devised by someone else gave me some distance from the subject of study. I felt that this distance might be useful in the data collection and analysis, rather than inhibiting or limiting.

**Observations and project documents**

Observations were carried out over a fourteen-week period in the second half of 2007. In the two units delivered by other teachers, the teacher introduced me to students as an observer, and students were advised to ignore me as much as possible. However, in both cases, the teachers also used time during class to talk to me about what students were doing, and how the planned session was unfolding. In Unit A, the teacher also often asked for me to comment on student work. I attended four lectures delivered by the consenting participants, and collected lecture information for reference, but primarily focused on the class sessions as the major area of student/staff interaction – where the projects were actually being developed. In each observation, the notes being taken were shared with the observed teacher, with requests for both clarification and confirmation that the records were representative from their perspective.

Overall, in Unit A, I attended class sessions in eight of the twelve weeks of delivery. For three of the remaining weeks, sessions were not given as classes, but re-structured by the teacher as booked consultations. I attended these for some of the consultations, but not all. There were two reasons for not attending all of the consultations: I had already attended several such sessions with the convenor, with no new data generated; and I felt that my presence could create additional stress for some of the students, particularly as the convenor had asked for my contribution to the commentary on student work.
In Unit B, eight sessions were attended. Two sessions were missed in the latter part of the semester due to illness, and another two were not attended where students were repeating a pattern of group work that I had already observed several times. Prior to making the decision not to attend, I discussed the planned activities with the convenor. In sessions where students were working outside of class or the pattern of delivery was established early (such as booked consultation meetings) and no evidence was present that it would deviate during the session, I left the session.

The primary method of notation used in the observations was chronological, with additional thematic notes recorded where these seemed important. Prompt notes were drafted for the observations that I hoped would help maintain focus on events as they related to the emerging project methods and domains. The prompts were based on the tentative categories found in the unit documents, including student and teacher activities, levels of direction, support and constraint, and the nature of student and teacher interactions.

The chronological notation in class sessions involved straightforward descriptions of observed activities, for example from Unit B:

9.15 teacher speaking, tells whole of class about intentions of the session and relation to unit, gives housekeeping messages. Lists activities that will take place today. Gives detailed instructions (see project B1, activity brief A). First activity is students in groups brainstorming words to describe a concept that will be provided to them: 20mins. Step 1, concept review; Step 2, discuss; Step 3, list related words; Step 4, share with class.

9.27 questions invited. none. Teacher advises students to get into seating-determined groups.

9.29 student approaches for clarification on what kind of words are required and how to map them on page. Other students gather to hear answer. Teacher advises whole of class that this is up to them.

9.36 students have commenced activity. Two students have moved to other groups and are collaborating on the work. One student approaches teacher for clarification. Teacher provides direction.

9.47 student raises question about form of outcome. Other students discuss. Teacher comments that they have taken an appropriate path. Reinforces their view.
9.52 students are nearing completion of task. Discussions in group and high noise levels.

10.00 Teacher calls for attention and close of activity.

I also made secondary notes on points of interest using a different notation style and, where necessary, developing these further in my research journal. In the early stages of the units, this produced huge amounts of written information. Over the semester, the data amounted to 24 sessions of between two and three hours, and descriptive data for approximately 70 hours of class contact. Patterns of delivery in some sessions were highly repetitive, allowing for shortened notation. Although the scope of the data created a major task of sorting and managing information, it also allowed for new concepts and categories to emerge during the observations and at later points in the analysis.

Teachers additionally provided project briefs, teaching materials and assessment documents. The form of these varied with each unit, but generally the project briefs provided a great deal of information about the overall requirements of the project, while teaching materials included task sheets, schedules, introductory texts and presentations and background materials for the work to be undertaken. Assessment documents included the forms used for recording grades against criteria and detail sheets for students documenting the precise form outcomes should be delivered in. I was also given access to assessable items after students had handed them in, and was able to review these as artefact outcomes of the project processes.

The unit in which I taught was delivered with detailed daily plans and records were maintained of all activities undertaken. Since I could not undertake observation recording in the same way as for the observed units, I chose to use chronologically detailed lesson plans and teaching records with additional notes about events during class and my perceptions regarding student progress, and asked a graduate student to observe and check the documents for accuracy. The unit was delivered over the same time period as the observed units, as three hours of contact per week, in a one hour lecture and a two hour class. I was not the convenor for the unit, but shared teaching responsibility with two other academic staff members, each taking two cohorts. We all worked from the same basic unit outline and project brief documents, but created our own lesson structures, teaching materials and content within the
outcome requirements. I was responsible for delivering two classes per week, and attended all of the lectures.

**Interviews**

Post-observation interviews were carried out with the teachers of the units in order to clarify observed phenomena and the intended learning outcomes of the projects. The interviews were semi-structured, and the participants were encouraged to diverge from the prompts to explain or argue for a different view of the process of delivery. I had initially planned that interviews would be taped. However, there was some concern from the faculty, and that I shared, that taping would present ethical difficulties. There were particular concerns that participants would be uncomfortable being taped because my role as educational development coordinator gave me some influence over issues of teaching quality. As a result of this, in the ethical approval document I nominated note-taking procedures for recording of observations. This was duly approved. In the event, participants also articulated that they were more comfortable with notes than with taping, particularly in talking about difficulties with their teaching practice and the external constraints on student learning.

The primary objection to note-recording as the primary means of recording interview data, made by Merriam (1998), is that in the earlier stages of a study the researcher may not know what is important, and therefore what to record. Nonetheless, the process also has some advantages. Given that notes can be made visible to the participant both during and after the interview, they facilitate interpretive discussion as part of the interview process (Lincoln & Guba, 1985). Lincoln and Guba also argue that there are numerous other advantages, for example: the interviewer is forced to pay close attention to responses; notes can include flagging issues for further discussion; and the notes can be shown to the participant as a means of member checking. This last advantage was particularly important in my study, where recorded information about teaching had been flagged as a potential ethical issue. Accordingly, I gave participants full view of the notes as they were being written, and encouraged them to take part as co-creators of the final records.

In order to maintain focus in the interviews during note-taking, I developed prompt sheets that included sections on the overall intent of the unit and projects, how this was achieved, and a rather over-detailed set of themes related to student and teacher activity in classes (Appendix B). In practice, participants were given scope to
talk about their rationale for the project structure, the aims and objectives, difficulties and teaching philosophy. The openness of the interviews also resulted in longer, more conversational interviews, and more holistic and fruitful outcomes than I had anticipated. They provided a greater sense of the complexity of the decision-making processes being used, and the relations between observed activities and the intended learning outcomes.

**Analysis**

The progressive research design process in educational case study inquiry lends itself particularly well to a continuous analysis process (Miles & Huberman, 1994). Initial stages require a peeling away of unneeded data, undertaken with sensitivity to the potential for new and more useful interpretations emerging from the data (Bassey, 1999; Lincoln & Guba, 1985; Miles & Huberman, 1994). Miles and Huberman (1994) suggest that there are three parts to the analysis of qualitative data: reduction, display and conclusion drawing, and verification. Reduction is the process of selecting and sorting data to codes, themes, or patterns. Display is the generation of tabular, matrix or diagrammatic forms in order to organise and clarify data and thoughts. Conclusion drawing and verification are the tentative development of ideas or concepts, which become increasingly concrete as the researcher returns to the data, elicits feedback and establishes clarity. These processes are iterative and take place throughout the analysis until the report is finalised. This general pattern of events closely reflects the process of analysis in this study.

Miles and Huberman (1994) also point out that there are specific difficulties with managing interpretations in qualitative analysis. In particular, and important for this study, are the difficulties associated with ‘impression management’, and the challenge of interpretation of action as a ‘behaviour’. The first of these issues is a consistent problem in interview and observation data that can be moderated by the use of persistent observation and triangulation. That is, it is difficult to sustain unnatural behaviours over time, particularly in the context of active work, and there was opportunity in the analysis to cross-check data from several methods of collection in order to obtain a perspective on its veracity. The second issue became more problematic over the span of the study. In the initial research design, observation data were inclusive, but were not specifically targeted at evaluating behaviours. In the first round of analysis, however, this emerged as an important
theme in the enactment of curriculum. In particular, the relationship between classroom behaviours and the curriculum was strong, and I felt, important. Thus care had to be taken in the analysis to ensure that, as far as possible, I did not overlay actions with unreliable interpretations.

Although provisional analysis was continuous during data collection, the major part of the analysis process commenced at the end of data collection, after the assessment processes had been completed. In this study, there were two distinct types of analysis, linked to the development of the curriculum model and the analysis of the cases. In the first exploratory stage, the aim was to develop sufficient understanding of the curriculum, its events, components and issues, and to identify a tentative framework for continued data collection. This stage was inductive, in that there was no predefined conceptual framework. The process involved a sifting of data from program documents and unit outlines, and iterative comparison with existing models, to generate the first curriculum model. In this stage constant comparative methods were used to develop the first propositions.

Patton (1990) suggests that the first issue to resolve when undertaking constant comparative analysis is whether to start working across the cases or within each case. I chose to treat the outlines as multiple cases in the first stage, in order to analyse for basic themes. From these themes, a within-case analysis of the unit outlines was used to generate categories and variables for the curriculum model. These were also subjected to negative case analysis. That is, the documents were repeatedly reviewed, initial propositions compared with the data, and the curriculum categories and variables revised until all of the cases were reasonably accounted for.

Exceptions in negative case analysis raise two issues for consideration – whether they are due to conscious or unconscious deception on the part of the participants, and whether the categories are prematurely closed. Given that the analysis was of documents, the first of these issues was possible only as a miscommunication or misunderstanding of the curriculum data in the documents. My concern during this phase was with the possibility of premature closure of the categories. On several occasions exceptions prompted a re-analysis of the working categories and the boundaries of the study. In some cases this meant a restructuring of the curriculum model. The outcome from this process was a substantially refined and extended set of categories that emerged as the initial working version of the curriculum model.
In the second stage of the study, unit documents, observation notes and interview notes were analysed progressively. For analysis purposes, the records from the unit I taught were grouped with the data from the observed units. There were three rounds of analysis carried out on the full data. First, the data were analysed in relation to the existing categories and variables in the curriculum model. The categories and variables were populated with data, diagrammed and tabulated in several rounds of adjustment. In this process, constant comparison and negative case analysis were again used to ensure that the data were accounted for, that saturation had been reached, and that a reasonably coherent logical structure had been achieved in the curriculum model. The development of this model as the organising structure for the data was a crucial part of the analysis for the overall study, providing the foundation for subsequent rounds of analysis. The final curriculum model is outlined in some detail in Chapter 3.

Following the stabilisation of the curriculum model, the analysis proceeded in three different directions: congruence within cases, variations between cases, and commonalities across cases. For the first of these lenses, concerned with the congruence within cases, an additional conceptual framework was overlaid on the data and patterns were sought in the logical consistency in the variables within each case. In the second of these analyses, the focus was on the commonalities among the projects. This involved a further negative and abductive (pattern-seeking) analysis of the data, used to generate a set of propositions about the common features of projects. For the third of the lenses, initial categories were developed as tentative explanations of differing types of project. The data were again subjected to negative case analysis. This time, taking account of the findings from the analysis of congruence within the cases, the negative case analysis was focused on the capacity of the typological constructs to account for all of the cases. This process resulted in the typology evolving in several directions before it became stable when compared with the data.

**Chapter summary**

In this chapter, the interpretive realist position taken with regard to the study has been outlined. The methods employed in this study have been chosen with regard to the fit with the requirements of the situation. The primary approach was that of a qualitative educational case study as defined by Bassey (1999). Qualitative
approaches are able to generate a holistic, rich and complex understanding of phenomena in its natural setting. This approach was appropriate to the focus of this study, given both my personal understanding of curriculum and pedagogy as highly contextual and responsive to changing conditions, my epistemological position, and the intent to delve for understanding and build concepts within the faculty context.

Morse et al (2002, p. 9) argue that there is a need first and foremost for the investigator to take responsibility for the internal rigour of the study process, and that external checks must be secondary to the ‘investigator responsiveness, methodological coherence, theoretical sampling and sampling adequacy, an active analytic stance, and saturation’. The concern for trustworthiness is thus balanced with the appropriateness to the form of the study. Trustworthiness has been established by the use of several methods, including awareness of the researcher position in relation to the study and the participants, prolonged engagement, persistent observation, negative case analysis, member checking and peer review. Further credibility has been supported through the triangulation of data sources and collection methods included the use of documents, observations, and interviews. Each of these aspects of the methodology has been described in some detail. In addition, the methods of data collection and analysis have been outlined. The case reporting style in this thesis is designed to provide sufficient detail to demonstrate the coherence and credibility of the data, and to enable readers to make judgments about the applicability of the findings in their own contexts.

The boundary setting and exploratory parts of the study involved the development of a curriculum model. In the following chapter, the conceptual basis for this model is explained, along with a description of the existing systems-based education models. Finally, the curriculum model developed for the study, and a description of its component categories and variables, is presented.
Chapter 3: Educational systems

One of the aims of this study was to identify the events and structures of which the curriculum is comprised, and to thereby define the boundaries of the curriculum. A model was needed that would provide a framework for conceptualising the curriculum and help to structure the data in a meaningful way, without imposing the need for an immediate thematic analysis of the content of the data. The most common approach used to carry out this kind of work in education has been based on systems theory. In this chapter, a brief overview of systems approaches, the existing system models for educational settings, and their benefits and problems is presented. This is followed by an explanation of the systems-based curriculum model developed for this study.

Systems approaches

As noted in the introduction to this thesis, systems approaches are not concerned with the 'constant attributes' of a single object of study, but with multiple parts and contextualisation as part of a wider environment (Gharajedaghi, 2006; Katz & Kahn, 1966). Systems are represented as diagrammatic models, which become containers for data and form the basis of a system explanation. Modelling is the diagrammatic process in which the relationships between aspects of a situation and their implications are hypothesised (Chen & Stroup, 1993). This allows researchers to organise data about the parts of any setting, and to generate a picture of complex interacting variables and relationships without the immediate imposition of judgement about how the system operates or why it operates as it does (Ballantine, 2001). It also allows for a conceptual modelling of any phenomenon so that the structures, relationships and interdependence between parts can be brought to light. System models are thus an effective tool for understanding complex situations and phenomena, where there is a desire to look at the situation holistically.

Systems representations are interpretations rather than complete and final accounts of the observed phenomena. As such, representations of variables and their interrelations are always tentative. Winne (2006) supports this perspective by commenting that while empirical research can both test models and generate refinements to existing models, the researcher should also be aware of the potential
for new models. The very nature of system models means they may never be complete, but are constantly prone to revision and expansion (Mandinach & Cline, 1994; Winne, 2006). The expectation is that each researcher will review existing models and adapt them to their own context or need.

The initial definition of a system model involves mapping the content and context of a system, and establishing the level of detail or granularity at which the system is to be viewed (Banathy, 1991). Granularity and its consistency is an important concept in the development of systems models. Bronfenbrenner (1977, pp. 514-515) argued that the levels of granularity in complex systems are best described within a nested structure:

- Micro-system – a system of single interacting variables, for example one person in a single setting engaged in a particular activity over a defined period of time. A student in class engaged in a group discussion.

- Meso-system – inter-relations between major settings, comprised of a number of micro-systems (sub-systems). For example, where student motivations to study are the focus of interest, the meso-system might include the relationships between the economic climate, nature of the program of study, family background, and previous learning experiences.

- Exo-system – systems external to, but having influence upon the meso-system. In an educational context they may be government agencies, the university community, media and social networks.

- Macro-system – the wider cultural or social system that defines patterns of behaviour.

Education, as a social system with multiple complex parts, in constant flux and interaction with its environment, epitomises the characteristics of a complex system (Hicks, 2007). Curriculum is similarly a complex social system in which people, contexts, events and structures interact in dynamic and complex ways over time. Print (1987, p. 25) argues that the contextual forces on curriculum influence the concepts of curriculum held by curriculum developers and that these in turn form the foundations for curriculum development. Curriculum ‘implicitly represents the philosophy and educational aims’ of institutional and national interests (Ratcliff, 1996b, pp. 8-9). Imperatives such as student numbers, spread of disciplines,
economies of scale and achievement of funding also play a large part in the organisation of resources and the setting of policies and procedures. Influenced in turn by government policy and cultural factors, these variables in educational systems affect access to physical and human resources, teaching patterns, and emphasis on types of learning process and outcome (Bates, 1989; Marginson, 2000; Symes, 2004). Curriculum is therefore context dependent, in that those developing the curriculum 'create a curriculum which is a construct of [the] culture' in which they are working (Print, 1987, p. 15).

Curriculum can, therefore, be described as involving multiple relations between major settings and comprising a number of micro-systems. In this thesis, the curriculum is consequently understood as a meso-system. Much of the research in education that is concerned with understanding relationships focuses on the micro-systems of the educational context, such as effects of interventions or change within particular curricular activities (for example, see Chung, 2003; Davies, 1998; Reeves & et al., 1996; Savin-Baden, 2004). Other researchers have been concerned with the relationship of exo-systems and education – for example, between social or cultural circumstances and education as a whole (for example, see Apple, 1996; Davis & Broadbent, 1987; Gould, 2003). In comparison little has been done to understand the complexity of multiple relationships and influences within the curriculum or across an educational setting (Biggs, 1993; Hicks, 2007; Lemke, 2000; Walther & Radcliffe, 2006).

The use of systems approaches in education

Systems theory has been used in education since the 1960’s, when it was introduced as a method of engaging K12 students in complex subject matter (Chen & Stroup, 1993). Systems theory has also been an area of interest as syllabus for school, university and professional contexts (Hmelo-Silver & Azevedo, 2006; Jacobson & Wilensky, 2006; Mandinach & Thorpe, 1987). It has also been the means of understanding learning processes (Buriak, McNurlen, & Harper, 1995). More importantly for this thesis, systems approaches have been the conceptual basis for understanding education as a system in itself (Betts, 1992; Mandinach & Thorpe, 1987; McNeal & Keith, 2001; Scott, 1995), and for theories of learning, teaching and curriculum design (Biggs, 1999; Doll, 2008; Frederiksen, 1989; Iannone, 1995; Semetsky, 2008). In their paper on the application of systems theory as a conceptual
framework in curriculum development, Chen and Stroup (1993) argue that systems theory, and systems approaches, have great potential for the development of coherent explanations for educational events. They characterise some of the major strengths of systems approaches for education as:

- Enabling engagement with complexity;
- A capacity to describe system dynamics and change;
- An ability to relate macro- and micro-levels of analysis.

Ballantine (2001) concurs with this view, arguing that systems thinking, and systems approaches, provide the means by which data from the complex interacting variables of education, and the relationships between those variables, can be represented, visualised, and ordered. The systems approach met the need for the initial stage of the study, that is, to understand the curriculum as a complex set of interacting structures, events and behaviours.

**Existing system models**

A review of the literature showed that while authors set a variety of boundaries to the curriculum, it is generally agreed that it is influenced by multiple larger systems, such as the institutional and social climate. Ratcliff (1996b) includes contextual variables including student interests, abilities and prior learning, and discipline paradigms or ways of knowing within a field. Additional influences on curriculum include government policies, associations, sponsors, institutional leaders and structural settings (Hawthorne, 1996; Print, 1987). Hawthorne (1996) adds to this teacher interests and abilities. The outcomes of these influences are very different approaches to curriculum and necessarily different curriculum outcomes (Print, 1987; Ratcliff, 1996b).

Two influential education systems models were identified in the literature: Dunkin and Biddle’s (1974) ‘model for the study of classroom teaching’ and Biggs’ ‘3P’ model (1999). Each of these models has been adapted by a number of authors.
A model for the study of classroom teaching

Dunkin and Biddle (1974) attempted to classify variables in the educational context using a system model. Focused on ‘classroom events’ and the influence of external and personal factors on student learning outcomes, Dunkin and Biddle argued that teachers and pupils occupy a complex system in which every variable influences learning outcomes. They further argued that without knowledge of the influences on, and context of, a classroom process, the results of research on learning lacked validity. Based on the terms used by Mitzel (1960), Dunkin and Biddle identified 13 classes of variables in the educational system, broken into four larger categories:

- **Context** - the set of environmental conditions governing what is possible in the setting, described as pupil, community and classroom contexts – these are the ‘set’ conditions in which students and teachers operate such as class sizes, required curriculum and schedules;

- **Presage** - made up of the personal characteristics brought to the classroom by the teacher, including personal characteristics, levels of training and capacity;

- **Process** - the activities of classroom teaching, in particular the observable interaction between student and teacher behaviours in the classroom, both instructional and interpersonal, and

- **Product** - the accumulated learning outcomes, both positive and negative, including both short and long-term effects on student growth.

While the categories in this model are focused on the classroom experience and exclude some of the variables noted in the previous section as important for curriculum, the model (shown below as Figure 1) was ‘quickly adopted by writers and researchers in the field’ (Hoffman, 1991, p. 924). A number of authors have continued to find the model relevant to studies, have commented on its usefulness as a methodological tool, and have adapted it for particular educational contexts. Young, Edwards and Leising (2008, p. 8) argue that the Dunkin and Biddle model is robust, providing ‘a comprehensive and grounded approach for looking at many of the significant variables associated with the learning and teaching process’. In particular, it provides a diagrammatic model that is easily adapted to different contexts and allows the reader to organise and identify complex concepts within the educational process.
Dunkin and Biddle argue that relationships between variables, indicated by the arrows, provide a means of speculating on causality by showing sequences of influence. Establishing relationships between categories or individual variables is the first step in identifying possible causal relationships (Dunkin & Biddle, 1974). Despite this, they also acknowledge that there can be both simultaneous change and reversals of the causal sequences. These relationships are described as ‘feedback chains that will, in turn, affect the teaching process in the classroom’ (p. 37).

Winne (2006) argues that a challenge is raised by the sheer number of variables presented in the Dunkin and Biddle model. This reflects a general challenge with system models: that each variable is necessarily presented as independent of the effects of every other variable, when it is more likely that the complexity of the system is such that each link is a chain reaction of relationships between any number of variables. When considered in this way, the potential for what Winne refers to as ‘combinatorial explosion’, or overwhelming amounts of information and complexity, reflects the challenges associated with systems models more generally. The inclusion of all variables that might have an impact on the system is unachievable and leads to a situation in which it is impossible to evaluate the system operations. The alternative, to exclude variables, no matter how distant, creates the risk that we have not understood the context and are, therefore, likely to make incorrect assumptions or judgements about causality.

Nonetheless, the use of both the categories of variables and the diagrammatic method presented by Dunkin and Biddle has had significant influence on subsequent research into, and theories of, education, including providing the impetus for Biggs’ 3P model (Prebble, et al., 2005), which is described later in this chapter. Perhaps reflecting the difficulty with addressing the system as a whole, the Dunkin and Biddle model has most commonly been used as a conceptual framework in which to identify the relationships between small numbers of variables. In particular, the studies have generally focused on evaluations of curriculum, learner perceptions of teachers, and influences of contextual concepts such as student learning styles or experiences external to the classroom.
Studies have also tended to be quasi-experimental, with one or more variables held constant while others are tested. Burris (2005) used the model as the theoretical framework for his study of the effect of problem-based learning on critical thinking ability and content knowledge. Focusing on the Process and Product categories, two instructional strategies were employed in order to identify score differences in student learning. In this case, the level of capability in the student cohort and the intended learning outcomes were held to be constant. Young, Edwards and Leising (2008) also used the model as a conceptual framework in their experimental study of the efficacy of a structured mathematics-enhanced curriculum and teaching approach. Roberts and Dyer (2005a, 2005b) used the model as a theoretical framework to identify the influence of learning styles on learning outcomes for students using an illustrated web lecture. Using an existing learning styles questionnaire, data on learning styles from 322 students were compared with examination results. As with many of the studies using the model, the teaching method (web lecture) was held constant while an aspect of influence was studied for its impact on the product category of the model. Ball and Garton (2002) and Garton, Kitchel and Ball (2005) used quantitative methods to explore the influence of student participation in discipline-specific youth and learning communities (context) on achievement and degree completion (product) in an undergraduate agriculture program.

Other studies have adapted the model to identify correlations between aspects of the curriculum. Garton, Spain, Lamberson and Spiers (1999) took the model as the starting point for identifying relationships between students' learning styles, their perceptions of instructors' teaching performance and student achievement. Mailloux (2006) adapted the presage section of the model to produce a study of correlations between student nurses' perceptions of teaching strategies, the learner context and sense of autonomy. Treating student teachers and their mentors as the unit of study, Kitchel (2006) revised the content of the model to identify the influence of gender on relations between groups, and rated the effects of these relations on the type of support experienced, and student satisfaction with that support. In her revision of the model, the 'classroom' of the process section became the 'learning environment', considered more broadly as the context in which student teachers and their mentors cooperate to achieve development. In a similar study, Kitchel and Torres (2006) used the model to identify the influences of personality type on mentor teachers' provision of psychosocial support to student teachers. Ahmad (2008) used quantitative survey methods to explore the influence of ESL teachers' mental constructs (presage) on
pedagogical approaches, and the interactions between this, the nature of the student cohort and the curriculum (context), and classroom activities (process). Ikeoji, Agwubike and Disi (2007) used a quantitative survey method to elicit the perspectives of senior agricultural science teachers regarding the general characteristics of agricultural science teachers (presage). The aim of their study was to undertake a needs analysis for the training of teachers to deliver vocational agriculture programs.

Related models

Reflecting the notion that system models are always tentative and subject to contextual revision, a number of authors have used the Dunkin and Biddle model as the basic format for creating models appropriate to specific concerns. For example, Kimpston and Rogers (1986) used the model to identify presage, context, process and outcome variables in the development of school curriculum. In a similar vein to Dunkin and Biddle, they aimed to identify areas for research focus in studies of the curriculum. However, they conceived of curriculum as an organisational system, rather than an educational one. Consequentially, their set of variables concentrated on the participants and resources needed to carry out successful curriculum development, rather than curriculum as an enacted system. In Presage for example, the concerns are primarily with organisational aspects of development – committee structures, procedures governing the process. Similarly, in the Context section, the costs and resources associated with curriculum design are of concern. Within Process, the concern was with how the tasks are carried out, rather than the curriculum itself. Product was focused on the perceptions of teachers and managers around the quality of the curriculum and its correspondence to the curriculum design specifications.

Park and Osborne (2005) adapted the Dunkin and Biddle model to focus on aspects of reading in the context of Agriscience disciplines. Based on a review of research in Agriscience teaching and curriculum, additional variables were included in the process and product sections, with a particular focus on concepts relating to reading (Figure 2).

Figure 2: A model for the study of reading in secondary Agriscience (Park & Osborne, 2004) This figure is unable to be reproduced online. Please consult print copy held in the Swinburne Library.
The 3P model

The most influential of the adaptations from the Dunkin and Biddle model has been the 3P model proposed by Biggs in several iterations from 1978 to 1999 and gradually developing from a model of study processes to a model of teaching and learning. Addressing the concern raised by Winne, Biggs simplified and reduced the number of categories and variables in Dunkin and Biddle’s framework. The categories were reduced to three stages: before, during and at the conclusion of the learning experience. These three stages collapsed the context variables of the Dunkin and Biddle model to the presage stage.

The original model of study processes (Biggs, 1978) shows a cognitive-behavioural conceptualisation of the learning process, focused on student values and motivations for attending higher education (Figure 3). The presage stage in this early model provides for two categories of influence incorporating contextual variables – the personal (student), and the institutional (the teaching). These factors create the conditions for values and motives in place during the learning process, which lead to a set of strategies and subsequently to the level and type of academic performance, or the learning outcomes of students.

*Figure 3: General model of study processes (Biggs, 1978)*

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In the 1999 iteration of the 3P models, focused on teaching and learning (Figure 4), the presage section has been developed further as two inter-related categories of student and teacher variables, while process and product sections have evolved to incorporate multiple variables, much closer to the original Dunkin and Biddle (1974) model.

*Figure 4: The 3P model of teaching and learning (Biggs 1999 p. 18)*

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There are some difficulties both conceptually and practically in using this revised model to organise data. Most significantly, a particular set of concepts about a state (deep or surface learning) is collapsed with the activities that support it. This undermines the basic tenet of systems theory, and the purpose of systems models.
That is, as containers for data, rather than in themselves as hypotheses or judgement about the goals or outcomes of the system. By associating deep and surface learning with the process of learning, the system model cannot be used to contain data without pre-identifying that the data are supportive of, or act against, a particular learning state.

Further, there are several shifts in granularity that give more emphasis to, and thereby support closer examination of, student factors than the other potential influences on learning. While student factors are a category, ‘teaching’ is subsumed as part of the overall teaching context. The factors affecting teacher behaviour and the interactions between teachers and students that were present in the Dunkin and Biddle model are lost. This emphasis on students, along with desired learner states, implies that the students’ pre-existing states have a greater influence on educational outcomes than teacher or contextual factors. This assumption is not supported by Biggs’ (1989, 1999) own argument, or by the literature, which suggests that student and teacher behaviours, based on beliefs regarding their roles in the learning process, have a similar level of influence on learning (Biggs & Moore, 1993; Shuell, 1993; Simons, 1993; Vermunt & Verloop, 1999).

The lack of specificity and conceptual shifts in the categorising of the variables in the 1999 version of the 3P model has presented problems for other researchers. Jones (2003), reflecting the criticisms that Winne (2006) made of the Dunkin and Biddle model, argued that given the number of variations of the model and the lack of specific details, there are few avenues to investigate its efficacy as a whole. As a result of this problem, perhaps, researchers have tended to focus on only a few variables at a time.

Nonetheless, the latter 3P model of teaching and learning has been highly influential. Most commonly, research using the model uses quantitative methods and focuses on the presage and process stages. As with the research studies that used the Dunkin and Biddle model, these studies are largely concerned with single variables of the presage stage of the model, and the influence of those variables on students' approaches to learning. Dart et al (2000), Zhang (2000), Hall et al (1995), and Drew and Watkins (1998), have all undertaken research that takes as its starting point student capacity. Using a range of measures (previous scores, personality tests, ability tests) these studies used the study process questionnaires designed by Biggs (1987) to develop statistical ratings for influence. Wong and Watkins (1998) also
used study process questionnaires to identify relationships between presage and process. They studied the relationship between the three categories of the model, but emphasised the classroom environment as the variable influencing approaches to learning. Jones (2003) focussed on the use of the study process questionnaire to identify learning approaches promoted by particular circumstances and student motivations. The aim of her research was to identify personality characteristics to provide a more stable set of variables for the presage stage of the model.

**Adaptations of the 3P model**

Hicks' (2007) adaption of the 3P model of teaching and learning (Figure 5) was part of an attempt to ‘give prominence to the concept of curriculum’ and to develop a ‘mechanism for bringing learning and teaching development and curriculum design and development together’ (p. 10).

*Figure 5: A 3P model of curriculum (Hicks, 2007)*

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The model is very similar to the 1999 3P model, with adjustments made to the variables in Presage to include assessment strategy, and a broadening of the Process and Product categories to include classes of activity. However, the difficulties seen in the 3P model are retained in this adaptation.

First, as with the 3P model, the level of granularity is inconsistent. The problem raised with the 3P model around the privileging of student factors over teacher factors also appears to be recreated, with no detailed listing of variables related to teacher backgrounds, beliefs or motivations. Hicks, instead, includes a new concept in Presage and within the Context group of concepts: mediation of learning. This concept could relate to the teacher. However, it is not clear that this is the case, and no explanation is given. While in the 3P model the shift was most noticeable between the student and teacher factors, in this model there are also changes in granularity between variables. For example, ‘assessment strategy’ is equated in level to the ‘context/climate/ethos’. Logically this is not the case. While context is necessarily inclusive of entire cultural systems, including those of the discipline and institution, assessment strategies are localised and individual activities.
Second, although in this model the Process and Product categories have been broadened to include classes of activity and outcomes, there is still a tendency to characterise desired outcomes rather than to allow for variations in data. Therefore there remains a conceptual inconsistency within the Process and Product categories that implies that while there is a desired state for processes, there is not a desired state for institutional procedures or the mediation of learning.

Beaumont et al (2003) adapted the 1999 version of the 3P model for the Problem-based Learning context (Figure 6). By focusing on a specific set of learning circumstances, they were able to create a more specific set of terms for each category and to avoid some of the problems identified with the 3P and Hicks’ models. While the Process category in their model includes variables that could be taken to imply states (for example, ‘reflection’) this model has resolved some of the issues found in the previous models. Specifically, by using examples of types of events as the variables in Process, and of a range of outcomes in Product, the problem with replacement of a variable with a desired state has been addressed. They have also attempted to account for teacher behaviours at a level that more closely reflects the granularity given to student factors, by including ‘facilitator expertise’. There is, however, still a tendency to focus on student factors rather than teacher factors and to oversimplify the contextual variables of the curriculum.

Figure 6: The 3P model, adapted for PBL (Beaumont, Sackville & Cheng 2003)
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Development of the curriculum model

In the PhD study undertaken for this thesis, consistent granularity and a wider contextualisation than present in the existing educational models were needed in order to capture the categories and variables for the curriculum and to ensure that none were given more weighting than others. This position is crucial for a study in which understanding is to be grounded in the data rather than tested against an existing hypothesis. In addition to the problems raised in the previous sections, none of the models found provided sufficient detail for the categories that were emerging in the study reported in this thesis. Nor do they provide the consistent rendering of categories that are required for the model to be an effective tool for the organisation of data. Although the Dunkin and Biddle model provides the most consistent
conceptualisation of an educational system, the variables reflect a concern with classroom teaching rather than the curriculum, and did not entirely reflect the data that were emerging from this study.

It was therefore necessary to construct a model specifically for this study, specific to a study of the curriculum, and to establish first hand the boundaries, categories and variables in the system. This task involved the analysis of curriculum data to provide the basis for naming of categories and variables. The naming of categories and variables, as noted by Winne (2006), is largely a conceptual process of organising data into logical groups. Bearing in mind the challenge around setting appropriate boundaries that is raised by Winne, it was important to carefully construct the boundaries of the system, and to establish a consistent approach to granularity and conceptualisation of the variables that would avoid the difficulties noted in the existing models. Selection of variables was done iteratively and pragmatically, with the intention of avoiding over-simplification and superfluous detail while ensuring that all variables that are part of the ‘natural process’ were included and consistent granularity was maintained.

In part, the boundary setting process was established during the early work to establish the overall boundary of, and concerns for, the study. The curriculum model was then developed to reflect the data around the structures, events and behaviours associated with the student learning experience in projects. As described in the previous chapter, this was primarily driven by the data, but also referred to the literature in the use of general organisation and naming conventions.

The curriculum model

Several authors argue that there has been little debate or discussion regarding curriculum, and that the definitions of the term vary immensely (Barnett, Parry, & Coate, 2001; Hicks, 2007; Ratcliff, 1996; Wraga, 1999). In the review of the literature, two dominant interpretations of curriculum were identified: as educational content or syllabus (Barnett, et al., 2001; Biggs, 1999; Jarvis, et al., 2003); or as the structure of programs (Hicks, 2007; Print, 1987; Smith & Lovat, 1991; Tight, 1996). The focus of this study was on the events and structures of the project curriculum, rather than the content or syllabus. The latter of these definitions was therefore the interpretation that most closely reflected the intent of this study. The curriculum model used to organise the data in this study is shown as Figure 7.
This curriculum model developed for this study resolves some of the overarching difficulties identified in the granularity of the 3P and Hicks models. First, the levels of granularity are stabilised by breaking each category into variables that have close to equivalent levels of detail associated with them and by allowing for multiple levels of granularity. Maintaining a consistent level of granularity in a system model is crucial to aid understanding and also to ensure consistent modelling of interactions between variables. The curriculum model can be approached at the category, variable or sub-variable level with no loss of consistency.

Second, the activities and explanations of their types are also separated from the judgement of their status. In Biggs’ model, and the adaptation of the model by Hicks, there is an assumed judgement regarding the appropriateness of learning activities, but the same criteria are not applied to the teaching context or learning outcomes. In my curriculum model, judgements regarding the efficacy of curriculum are left to the analysis of data, rather than being embedded in the model.

Third, by distinguishing between the primary system (curriculum) and the external influencing systems (context and people), natural boundaries are retained between the issues affecting curriculum development and the development itself.

While the initial boundary setting was relatively straightforward, I found an inherent teleological problem with translating the curriculum to a system structure. Definitions by a number of authors suggest that curriculum is both an intention, and an enacted process (Bloom, 1981; Hawthorne, 1996; Print, 1987; Ratcliff, 1996b). Hicks (2007) argues that is unclear whether curriculum is a fixed entity, subject to revision, or an emergent one, defined through ‘a process of students engaging in learning’. I engaged in a series of iterative developments of the model to deal with this problem. It was only partially resolved with the use of the Presage category to capture curriculum plans in their least specific form. Given that plans are ultimately enacted, there are many instances where these cross over between Presage and Process, necessitating a somewhat arbitrary division between the before and during categories. Similarly, assessment is found in both Presage and Process, and involves complex overlaps with feedback and learning activities, particularly where an assessment method is explicitly intended to operate as a learning experience, for example as may be the case with presentations of work in progress. The allocation of data to each variable therefore necessitated some repeats of similar data in more than one variable, and some distinctions to be made between formal and informal
Elaboration of the system categories

Four levels of granularity were included in the curriculum model. The first or highest level is the ‘category groups’. Category groups are the general categories that can be identified as having multiple sub-systems. The second level is ‘categories’. At the third level, each category contains variables. A fourth level contains sub-variables. Two category groups, ‘context’ and ‘people’ are detailed only to the third level. As the primary focus of the study, the category group ‘curriculum’ is detailed to the fourth level. In this section, each category group is discussed in turn. Categories, variables and sub-variables are dealt with in sequence within each of the category groups.

Context

The Context category group comprises three categories identified in the study data: institution, program and unit. These categories are in part hierarchical. Institutional variables have the strongest influence over program variables, while program
variables have a strong influence over unit variables. The institutional and program variables in these categories also have a significant influence on the curriculum by providing the formal and informal rules, structures and norms within which students and staff work. The level of influence is increased where those norms are well established or strongly communicated through institutional policy and professional associations, and where compliance expectations are high. However, the categories and variables are also inter-related. Over time, unit outlines can influence program structures and discipline cultures. When a critical mass is achieved with any change in curriculum practice, this is also likely to impact on institutional culture and organisational structures.

Institution

The institution category includes prevailing philosophies of education within an institution, the constraints on curriculum delivery both financial and cultural, and the types of educational experience expected or mandated by the institutional policies, procedures, and the explicit and implicit rules of operation.

This is particularly salient where the institution has a policy with regard to curriculum. The institution relevant to this study has such a policy, along with centralised timetabling of classes and rooms, and requirements regarding documentation and assessment practices. These characteristic parameters form the basic structure within which the curriculum can operate in each institution. The more detailed and enforced those parameters, the more influence they exert on what kind of curriculum can be set in place, and how it might be carried out. Three general areas of influence at the institutional level were defined as the prevailing culture, the organisational structure, and the faculty structure:

Prevailing culture – the explicit and implicit values present in university plans and goals, the influence of research on teaching and curriculum, policies and procedures both formal and informal, the privileging of particular educational processes and outcomes, and the working environment for academics and students. Prevailing cultures influence and are influenced by government policy, internal organisational structures, faculty and program structures, staff and student input, and external discipline input to programs.
Organisational structure – the limits to physical, financial and human resources, timetabling of classes and accepted allocations of teaching time, availability and types of learning spaces, teaching quality and student achievement indicators, and the level of required compliance with the prevailing culture, acceptable forms of reporting and quality management.

Faculty structure – the organisation of programs and teaching within a faculty or school, resourcing, expected levels of outcome and qualifications awarded, staffing profile, local policy and procedures, and interaction between programs of study. Faculty structure is influenced by factors including the institutional culture, the discipline cultures of programs, staff and students who provide feedback and make changes to programs over time, and the place of the faculty within the organisational structure of the university.

Program

Program refers to the program of study leading to a qualification, comprising a series of learning experiences that may be structured as units of study, projects or experiences leading to assessable outcomes at a particular level. The nature of a program is influenced by factors including the institutional culture, the faculty and discipline culture, staff and students who construct and adjust it over time, its place within the organisational structure of the university, and its relationships with other programs. This includes the discipline derivation of the program, the overall program structure and the curriculum structure:

Discipline derivation – the whole or partial influence of disciplines on the program and units of study within it, traditional and preferred educational practices and expectations, and the way in which learning experiences are designed and carried out to meet those expectations.

Program structure – the organisation of units of study, the awards granted at completion of the whole or a part of each program, structures affording interaction with other programs across disciplines or levels of award.

Curriculum focus – the overall program focus and whether it is designed to reach particular outcome goals, leading to expectations of the content of units and the use of particular curriculum models across a program.
Unit

Unit refers to the unit of study as set by the program structure. It is the discrete set of educational experiences for which curriculum design and delivery are carried out. A unit is identified by the awarding of a grade or requirement of its completion, any number of which accumulate toward a final qualification award. Units may be a series of classes with a variety of educational activities organised around a central theme or set of skills, or they may be structured as stand alone educational activities, without formal class time allocation. The data for Unit were grouped into place in program, resource allocation and entry requirements:

Place in program – the level of the unit in relation to the overall program of study, relationships with other units, and the relationships with other units and/or programs affecting cohort entry experiences and/or cohort mix.

Resource allocation – including the total hours allocated for student contact time, levels and types of staffing in relation to staff/student ratios. Resource allocation has implications for the types of contact possible within available physical spaces and staffing levels. Additional resources could include technology and technology support, and resources for student/staff expenditure.

Entry requirements – the expectations, formal or informal, regarding students’ previous experience prior to enrolment. Data for entry were an explicit concern for teachers, expressed during interviews as a benchmark from which they identified the level of previous experience of students.

People

There are two obvious groups of people involved in any curriculum – teachers and students. As described by Print (Print, 1987, p. v), curriculum is centred on the people involved as: ‘the reality of interchange between teachers and students, students and students, students and learning materials and opportunities’. While the role of teachers in planning and delivering the curriculum has been well documented, students are notably absent in the literature on curriculum theory. Regardless, both the Dunkin and Biddle and 3P models imply that student characteristics have an influence on the curriculum, both in planning (where teachers use expectations about the students to aid in setting the curriculum) and in enactment (where student
behaviour affects the activities). In addition, students act as co-creators of the current curriculum delivery, learning experiences and outcomes.

**Teachers**

Teachers have a gamut of prior experiences, interests, abilities and preferences that influence their approach to curriculum development and delivery. These variables influence their perceptions of student needs, the nature of learning, what is appropriate curriculum for their classes and how it should be delivered. Sometimes referred to as an ‘implicit theory’ (Biggs, 1999, p. 7) of teaching, this set of beliefs about what learning is, and what the teacher does, is the basis for all curriculum development. While aspects of the teachers’ characteristics could be grouped in any number of ways, during interviews teachers most clearly articulated their previous experiences, beliefs about the nature of design education and learning, and expectations of students in the current context. These factors could be conceptualised in a number of ways, such as knowledge drawn from previous experiences and underpinning value systems influencing their beliefs and expectations. Indeed, in the Dunkin and Biddle model, teacher characteristics include the nature of their training, teaching skills, intelligence and personality traits.

In this study, however, the concepts most clearly present in the data were used as the variable titles. When tested with the subsequent analysis of the project cases, they remained sufficiently robust as containers for the data. Thus, the three variables provided for teachers are experience, beliefs and expectations:

**Experience** – including the professional, teaching and learning experiences that are brought to bear on teaching in the academic context. These beliefs include those informed by their previous experiences of learning in the discipline, or in other disciplines, and that interact with the discipline context as noted in the context category. The integration of those experiences with current contexts influences staff beliefs about curriculum and learning, and form the basis for curriculum development.

**Beliefs** – including the beliefs about discipline educational norms and appropriate types of learning activities, appropriate contexts for learning and levels of outcome. Beliefs about the educational process shape understanding about potential processes and outcomes in the discipline context.
Expectations – including the roles of students and staff in the educational process, student backgrounds, capacity and behaviours. Expectations regarding teacher and student roles in the learning process, and student capacity, help to shape decisions about the level and delivery mechanisms of projects. Along with experiences and beliefs, expectations also shape the way in which variations in student learning processes are conceptualised.

Students

Students also bring a range of previous experiences, beliefs and expectations to their learning experience. They are influenced by the educational culture of their previous learning and professional experiences, and by what they have understood to be the nature of the university experience. They may have developed assumptions regarding the nature of the discipline, the type of knowledge and skills to be gained, types of learning experiences and roles of staff and students in achieving learning outcomes and awards. This argument is strongly supported in the literature, where the capacity of individual students to engage in particular learning activities, influenced by the type and level of previous educational experiences, and in their capacity, preferences and motivations for learning in particular ways has been the subject of much debate (see for example Biggs, 1999; Ratcliffe, 1996b).

Given that students are involved in the enactment of the curriculum, but only indirectly in the planning of curriculum, stronger emphasis is given in the model to their prior knowledge than to their beliefs about the educational process. Rather, beliefs are treated as extensions of experience and expectations. Data for these concepts were therefore grouped under the three variables of experience, knowledge and expectations:

Experience – learning, social and professional experiences that are brought to bear on the current academic context. The type and content of those experiences, and their significance for the student, influence students’ perceptions of the learning process as well as their capacity to engage with the current curriculum.

Knowledge – content knowledge and understanding of the educational processes as they related to the current curriculum. The level, type, quantity, and rigidity of that knowledge may impact on how well a student is able to recall and integrate previous knowledge with new information.
Expectations – the expectations held by students regarding the roles of students and teachers in the educational process, discipline educational norms and appropriate types of learning activities, organisation of learning, levels of independence and outcomes. The flexibility of those expectations may influence how easily a student adapts to new curriculum and perceives the learning experience.

Curriculum

In keeping with the Dunkin and Biddle and 3P models, the three categories within the curriculum category group in the curriculum model are entitled Presage, Process and Product.

Presage

The dictionary definition for presage as a noun is ‘an intuition or feeling of what is going to happen in the future’ (Merriam-Webster Online). In both the Dunkin and Biddle and Biggs models, presage is prior to the learning experience. In a curriculum system, presage can similarly be conceived of as the point of concrete inception of the curriculum, prior to delivery. It is during presage that staff, in the development of the curriculum, make links between previous experiences and expectations, institutional, program and unit contexts, and their understanding of the characteristics of the student cohort, and begin the process of designing activities, anticipating interactions, and preparing resources for learning.

Although presage occurs prior to curriculum delivery, the outcomes of this process are also affected over time in a loop of experience and adjustment. Plans made prior to delivery are subject to revision during delivery as new insights or experiences arise, providing impetus for change. This flexibility is an important aspect of curriculum delivery, forming the basis for responsive teaching practices (Baker, 2006; Webb, 2007), and reflecting the notion that everything is ‘connected to everything else, because all variables form a system’ (Biggs, 1999, p. 19). Over time, each additional experience during subsequent stages of delivery provides new information and concepts that can be incorporated into the next curriculum plan.

Delivery structure

Many authors argue that the studio is the primary and preferred environment for carrying out design education (e.g. Crouch & Pederson, 2000; Gaston, 2007; McCoy,
and that this environment has significant influence on the way learning proceeds. It can be inferred from this argument that structures, including the time available for contact, the existence of schedule limitations, and the organisation of the learning environment have implications for the curriculum. However, it has also been widely commented that while the open-access studio environment was once ubiquitous there have been increasing pressures to adjust the way that learning is organised (Gaston, 2007; Green & Bonollo, 2003; Hearn & Quinn, 2007; Smith, et al., 2009; Swann, 1986). The studio environment can no longer, therefore, be assumed as the site or structure of learning in design. Delivery structures in design education are highly variable and appear to be increasingly so.

The amount of contact between teachers and students, the schedule of delivery and the overall organisation are likely to differ between cases. In order to capture this data, the title of ‘structure’ was given to the variable concerned with the amount of contact time associated with any project, the schedule of delivery and the overall organisation of the environment. Data for structure were primarily compiled from unit outlines, schedules, planning documentation and project briefs where these were provided, with additional data for comparison generated through observations and interviews with teachers. Data were compiled into three variables, time/weighting, schedule, and organisation:

Time/weighting – the hours and type of contact timetabled for the unit, staff / student ratios, and the length of time allocated to each major outcome.

Schedule – any imposed schedule of teaching time, including the implications of scheduled or timetabled resources for teaching methods, and how that time was divided in relation to weekly contact.

Organisation – the broad structure of the curriculum environment, and overall approach, including a general plan for particular types of learning activity, such as workshops or lectures.

**Intended learning outcomes**

Curriculum intent is conceptualised by Print as the ‘direction that curriculum developers wish learners to go as a result of participating in the curriculum’ (Print, 1987, p. 121). The aims and objectives commonly found in curriculum documents are forms of curriculum intent. Print structures the terms hierarchically, using aims to
denote the overarching social intent of an educational situation; goals to denote the
general content and skills which students will demonstrate; and objectives to denote
the specific tasks students will carry out and the level to which they will conduct those
tasks. There is much discussion in the literature about the correct terminology –
whether it is goals, learning objectives, learning outcomes or intended learning
outcomes. There are further debates regarding whether there is, or should be, a
distinction between the intended learning outcomes and the assessment of those
outcomes (Biggs, 1999). The degree to which this is the case cannot be assumed,
and must be interrogated in each case.

In the context of the study described in this thesis, ‘intended learning outcomes’ was
used as an overarching descriptor of intentions with regard to student learning as
defined by project outcomes. This was not a rejection of the distinctions between
aims, goals and objectives made by many authors (Print, 1987). Nor does it discount
the interrelationships between intention and assessment. The reasons were
pragmatic and three-fold. First, descriptions of curricula intent are phrased in a
multitude of ways by teachers, and do not always conform to a particular structure.
Secondly, the aim of the study was not to replicate the curriculum design process, for
which these categories are used as a structuring instrument. Rather the aim was to
capture the intent of a curricula process as presented by the teachers. Thirdly,
despite the distinctions and collapses between the terms, in practice there is often
substantial overlap between them. The aim of this set of variables was to capture the
intentions as part of a planning process, in order to identify whether the espoused or
planned curriculum demonstrated coherence with the enacted curriculum and the
judgement of achievement embodied to some degree in the assessment process.

In addition to the distinctions between terms, intended learning outcomes are often
structured in dimensions. The naming of the dimensions differs somewhat in differing
contexts. Ratcliff (1996b) describes them as the knowledge, skill and ability sets
appropriate to a particular field. In Barnett et al’s (2001) study of curricula they take
the form of ‘knowledge, action and self’. Furhmann (1996) lists three foci: knowledge,
skill and character. In a capabilities approach, the dimensions are ‘knowledge, skills,
self-esteem and values’ (Stephenson, 1992, p. 1). Variations in emphasis depend on
the range of contextual factors considered above. Common shifts in emphasis
include those between knowledge, process, or capabilities. At Alverno College, for
instance, goals are process oriented and although referred to as competencies by
Hutcheson (1996), are aligned with the capability approach, covering such objectives
as problem-solving, analysis, effective citizenship and communication. In reality categories also often overlap. For example, an intended learning outcome such as independent problem-solving suggests theoretical knowledge (knowing what), procedural knowledge (knowing how), skills (application of that knowledge) and behaviour (doing so in a particular way). Dimensions used in the literature are therefore broadly based on similar conceptions of knowledge, skill and behaviour, but can be identified with a range of terms and emphases. In this study, the data relating to intended learning outcomes was thematically analysed and organised into three groups entitled knowledge, capability, and qualities:

Knowledge – knowledge to be gained or demonstrated by students in carrying out the work. This data set included the type of knowledge, the amount of knowledge, depth and breadth, and any salient information about the way knowledge was organised or described. Within this sub-variable, knowledge was broken down into theoretical knowledge (knowledge of the field, philosophies, principles), situational knowledge (knowledge of particular situation, such as a problem context), procedural knowledge (knowledge about how to do something), and technical knowledge (defined practice knowledge, such as software, production, specifications).

Capability – expected demonstration of capabilities concerning achievement of an outcome, including the application of procedural knowledge and skills. In particular, this was concerned with what students should be able to do.

Qualities – expectations with regard to the personal qualities, values or behaviours students should demonstrate. The data associated with this variable were related to the non-specific, qualitative, or affective aspects of teacher expectations about learning outcomes or products.

**Process**

Following Dunkin and Biddle, the title of ‘process’ was given to the category of variables regarding what students and teachers actually ‘do’ during the time allocated to particular educational experiences.

Biggs (1999) argues that the variables in the Process stage are the result of the interaction between Presage variables. Curriculum delivery, particularly contact time with students, is a highly complex and dynamic process and builds on the full range of pre-existing variables. During class time, it is possible to observe a range of
interactions between variables such as the teacher and student approaches to communications, the way in which the class time is organised, and the learning opportunities or activities. However, in the 3P model, process only contains the 'learning-focused activities' leading to deep or surface approaches in students. For the model presented in this thesis, a more detailed set of variables was required. This allowed for both student and teacher activities and behaviours, resources and structural aspects of the curriculum as they present during delivery to be recorded.

Data for the process category were primarily drawn from observations of classes. Additional data were drawn from curriculum documents that identified aspects of delivery processes, lesson plans where these were available, and from the learning resources and other documents provided to students. The data available from classroom observations focused on the events during contact time between teachers and students. Additional data from teacher and student comments were also noted and included where there was sufficient evidence of activity outside of contact time to draw conclusions about the nature of the activities or behaviours. Events during this time therefore included timetabled and other formal contact between students and teachers, including classes, workshops, lectures, tutorials, online discussions and supervisory meetings, and where sufficient evidence was available, activities carried out outside of contact time by students.

**Project scope**

As noted in the introduction to this thesis, Adderley et al (1975) cite the divergent nature of projects as a challenge to definition. Blair (2006b), more specifically referring to projects in the design education context, also indicates that there are significant variations between projects. As projects can take any number of forms, establishing the boundaries or scope of a project, along with its internal complexity, is an important aspect of drawing the overall picture of the type, focus and level of the learning expected.

From the perspective of curriculum development, decisions are required about the boundaries of the project, the problem or problems to be addressed, and the degree of decision making to be required of students. There are also controls on these processes, including control exerted by instructional materials that regulate how students work (Vermunt & Verloop, 1999). In the curriculum model, these aspects of the project scope were broken down to three concepts: the scale of the project, the complexity of the project, and the controls placed on the project. These collectively
indicated the amount of work students were required to undertake to satisfactorily complete the project, and the degree of independence involved:

Scale – the overall scale of the project, how many products, size of each, the size of the area of investigation or depth of investigation required. The data for scale were deeply interconnected, in that the data could not be broken down further and still remain meaningful.

Complexity – the number of parts of a problem to be addressed, the level of integration of problem areas, and the degree of difficulty of their integration. The data for complexity were not necessarily clearly defined, but tended to be embedded in descriptions of the considerations within each project variable.

Controls – limitations on student self-determination of project processes or products, such as determination of stages, processes or product topic and format. These controls came in numerous forms and the data thus varied between quantifiable aspects, such as the inclusion of steps, and more general descriptions of requirements.

**Scaffolding**

Learning activities are defined by Print as those activities ‘offered to learners in the teaching-learning situation which are designed to enable them to acquire the designated content and thereby achieve the stated objectives and more broadly, the curriculum’s intent’ (1987, pp. 164-165). This definition is rather more limited than that used for the curriculum model. In any context, and for any aims, there is generally a range of possible teaching methods, learning activities and resources that would support the achievement of the learning objectives. These include the structured, planned activities and information delivery that takes place in the scheduled contact time with students, the activities carried out by learners outside of the classroom, such as independent study or field trips, resources made available during and outside of classes, and opportunities for discussion with teachers or peers. In the project context there are the tasks involved in carrying out the project, as well as additional tasks that are intended to support the project learning process but do not form part of it, such as reflective journals, blogs or process diaries. The types of scaffolding found in this study were inclusive of each of these types of learning activity. The scaffolding variable comprises all of the activities and resources that support student learning. In
the model, these were broken into sub-variables as project tasks, adjunct tasks, set activities, knowledge resources and discursive activities:

**Project tasks** – The specific and explicitly named tasks students were required to carry out in executing the project. The data were inclusive of the tasks explicitly defined in project briefs, the tasks recorded in observation notes during class sessions, and the tasks described by teachers in interviews.

**Adjunct tasks** – the type and explicit purpose of additional tasks students were required to carry out for assessment purposes. These were tasks that were not demonstrably required for project completion, but that either informed its development or were required as an additional or complementary learning activity.

**Set activities** – The type and explicit purpose of structured activities taking place in or out of class, in support of project progression. These were activities that were set, directed and managed by teachers.

**Knowledge resources** – Type and location of knowledge resources provided to students including lecture material, texts or examples. This also included the knowledge content of interactions during class sessions.

**Discursive activities** – Timing and nature of activities related to feedback or discussion of project experiences with peers or teachers. In particular, data recorded in this variable were focused on the use of discussion as a learning activity.

**Roles**

It is widely agreed that both teacher and student roles in the learning process are subject to variation, depending on their beliefs, experiences and response to any given context. In the recent literature on educational theory, there has been a consistent move to recognise the interactivity of the educational process, and to integrate research about how teachers go about teaching with research about how students go about learning (Vermunt & Verloop, 1999). Teachers, in particular, are expected to respond to the needs of the curriculum and the capacity or needs of students in any given context. It is further argued that teachers take on specific roles in the teaching process and that these roles may be either congruent or dissonant with the curriculum and with student capabilities (Grow, 1991). In addition to the controls embedded in projects, therefore, teachers regulate activity by assuming roles in relation to their interaction. Equally, students may influence teacher roles by
assuming roles that require responsive teachers to adjust their behaviours in order to meet the learning needs. The joint effects of the student and teacher roles have a great deal of influence over the way a curriculum is enacted (Shuell, 1993; Vermunt & Verloop, 1999). In line with these arguments, data were identified in relation to the roles taken on by teachers and students. In particular, this was related to types of student-teacher interaction, and the degree of control implied by the style of that interaction. This was the most difficult of the variable structures to stabilise. In several iterations, it took the form of interactions and behaviours, roles and behaviours, and was split between four or two sub-variables. In the final iteration, it stabilised as teachers and students, allowing for data to be grouped according to the people but including both the observed behaviours and the explicitly named roles:

Teacher – the explicit or implied teacher role in relation to the project and the disposition of the teacher in relation to students. This included the level of control and direction, as well as the type of instruction given during observations and observable behaviours such as movement around the class.

Student – the explicit or implied student role in relation to the projects, and the level of independence and control shown by students in decision-making for their projects, including actions to progress project work during class and evidence of progress between classes. As with teacher roles, this included the response to instruction, and observable behaviours such as classroom movements.

Product

In contrast with the dearth of literature on the meaning of curriculum there is a substantial body of work on the assessment of student learning. The literature broadly covers themes of assessment that enhances learning and capability (Boud & Falchikov, 2006), and the challenges of aligning assessment or gaining meaningful understandings of learning through instruments (Rowntree, 1987). More generally, authors describe two broadly accepted types of evaluation of student performance: formative assessment, and summative assessment. Formative assessment, which may or may not include grading of work, is aimed at providing learners with feedback on their performance that they may then apply to future work. Wright (1996) argues that this process is also valuable for immediate feedback to teachers regarding the efficacy of the curriculum, and equally provides an early opportunity to revise activity. Summative assessment may also provide feedback to both students and teachers,
but is more specifically carried out with the aim of categorising achievement and allocating a grade or other code for certification and accountability purposes (Boud & Falchikov, 2006; Print, 1987; Wright, 1996).

There is a boundless selection of measures, formats and approaches to assessment. The effects of instruments and assessment processes can be broader than providing data on learner achievement. It is well established that learners identify and are often motivated by the assessment instruments and processes, and what they imply is important to the teacher (Boud & Falchikov, 2006; Jarvis, et al., 2003; Rowntree, 1987). Thus, student learning is to a large extent directed by the form and focus of assessment in any given context. There is an additional use for evaluations of student performance – to provide teachers or curriculum developers with information about the efficacy of the curriculum in achieving the original objectives, and providing a basis on which adjustments may be made for subsequent delivery (Print, 1987; Wright, 1996).

Biggs presents Product as the learning outcomes in terms of type – the types of outcome, knowledge, skills and involvement of the learners. Dunkin and Biddle refer to Product as the learning gained in respect of short term learning of knowledge, attitudes and skills, and the long term personal growth of the student. For a curriculum model, however, the focus is on the way in which curriculum is organised to afford such outcomes, rather than measuring the outcomes themselves. This category of variables was therefore concerned with the evaluation of learning outcomes as defined by the curriculum. Teacher perspectives on how learning was to be measured, and the outcomes of the curriculum, were gathered from unit documentation, including project and assignment briefs, recording of the assessment evidence and processes during assessment events. Supplementary data regarding expectations or perceptions of learning outcomes were identified in interviews with teachers and observation notes. The final set of variables comprised the evidence, criteria and methods of assessment.

**Assessment evidence**

The timing, type and distribution of weighting (percentage of overall mark) were collated under Assessment Evidence. Data were gathered from documented requirements for evidence of learning in unit outlines, project and assignment briefs and other resource materials. Assessable items were viewed during the assessment process, and additional data on the perceptions of teachers regarding the nature and
relation between learning outcomes and evidence of learning were recorded in observations and teacher interviews. Data regarding assessment evidence were captured under form and weighting:

Form – the timing and format of any events or submissions that were formally assessed, whether formative or summative. This included the nature of the artefact, the number of pieces and what was included within each piece of work.

Weighting – the weighting of grades to assessable items was recorded. The distribution of grades provided an indication of where emphasis was given to particular items. This included a breakdown of any percentage points or grades associated with a particular piece of work, either by stage outcome or product.

**Assessment criteria**

The variable of assessment criteria refers to the way in which marks are allocated to work, the balance of focus in assessment on various aspects of the evidence of learning, and the underpinning qualitative judgements that are made. Data regarding assessment criteria were compiled from unit documentation, including project and assignment briefs. Further data regarding were found during observations where elaboration was provided to students within project and assignment briefs, and within provision of resources, verbal instructions and feedback on work. Additional clarification of criteria and their underpinning concepts was drawn from interviews and records of assessment outcomes. In a similar fashion to the structuring of data for evidence, data about criteria were grouped into the two sub-variables of content and weighting:

Content – the explicitly named criteria including the terms used in project documentation and in grading sheets, indicating an emphasis given in grading to aspects of the evidence. This included notation of differences between explicit criteria provided to students and teachers’ emphases on particular criteria during interviews.

Weighting - the weighting of criteria grades (where used) for each item. This included a breakdown of the criteria and any percentage points or grades associated with particular aspects of the work.
Grading methods

Data regarding the processes undertaken during grading, including the format and content of documents for recording grades and comments, the structure of the assessment activity itself, and moderation processes were grouped as ‘assessment methods’. Data for assessment methods were identified in unit outlines, project and assignment briefs, and from observations of assessment processes. Additional data were gathered from interviews with teachers. The number of assessors, the timing of assessment, and the rationales for assessment methods were recorded. These data were grouped under assessors and means:

Assessors – the identity and number of assessors were recorded, including those who had primary responsibility for the application of grades, those who gave input to the process, and moderators.

Means – the approach to and structure of the assessment activity was recorded, including how students submitted work, the use of forms or particular processes, organisation and timing of assessment.

Chapter summary

In this chapter, an overview of systems approaches has been put forward, along with some of its utility for educational enquiry. The fundamental terms required to understand systems have been described, and some of the processes and complexities of modelling a system have been explored. In summary, systems principles allow for mapping of the characteristics, patterns and processes that occur over time in any system, including the curriculum. While providing no ‘universal rules’, systems approaches generate a rich, complex account of phenomena that accords with the qualitative approach taken to this study.

In reviewing existing models of educational systems, two influential and interrelated models were identified. The Dunkin and Biddle model for the study of classroom processes and the Biggs 3P model. A review of literature and a critique of the models identified several challenges both with the uses of systems models in education, and with those particular models. In particular, the 3P model collapses levels of granularity that have subsequently appeared in adaptations to the model by other authors. Additional challenges exist in the mapping of the system to maintain clarity and specificity of the categories and variables, in the modelling of the system to
identify relations between the variables, and in the analysis of the system to provide valid explanations for congruence between the categories and variables.

The systems-based curriculum model developed from, and for, the data has been presented. The variables of the system have also been described, including the rationale for their inclusion and framing. It has been argued that the variables are designed as fit for both the data emerging from the study, and with the concepts in the literature. The system model resolves some of the problems identified with previously existing models. Specifically, the model was designed with an attempt to organise information into a consistent granularity or level of detail, a consistent conceptual rendering of variables, and sufficient coverage to carry out a meaningful analysis of the case data. There are some remaining issues with the management of a dynamic system using the curriculum model. Nonetheless it is argued that the curriculum system model can be adapted for use at varying levels of complexity and has been sufficiently developed to provide an appropriate organisation tool for the collection of data in this study.

The curriculum model presented in this chapter was used as the organising structure for the analysis of the documents, observation and interview notes. The variables were populated with condensed data in tabular form over several iterations of reduction and analysis. The condensed tables are provided as Appendix C to this thesis. In the following chapter, narrative descriptions of the cases are presented.
Chapter 4:  
Case descriptions  

Case study reporting, as described in Chapter 2, involves the presentation of a rich or thick description of the case or cases (Geertz, 1973). The aim of such reporting is to present sufficient information for readers to have a vicarious experience of the cases and that they may be able to assess the usefulness of the study in their own context. Miles and Huberman (1994) note that qualitative methods of data collection can produce overwhelming amounts of information, and that as a result such reporting also requires succinct summaries of the data.

In this study data were collected from three units (modules or courses of study within the programs). Within these units, there were a total of six project cases. The case data collected for this study were collected from publicly available program and unit documents; teaching materials including lesson plans, assessment forms, project and activity descriptions; my own teaching records; student work; notes from the observation of classes and interview notes. As described in the previous chapter, the data were analysed for structural organisation thereby leading to the development of the curriculum model. This model allowed the data to be consistently organised and analysed. The large amount of data presented a significant challenge in managing and synthesising themes. To address this challenge, the data were organised into tabular form (see Appendix C) using the curriculum model categories and variables, thereby condensing the information to a manageable level. Nonetheless, there was still a significant amount of material to manage.

The scope of this study also presented some challenges. The study was structured around analysis of the data using four lenses: structures and components or variables making up the curriculum, internal coherence within each of the cases, common features or themes found across the cases, and variations across the cases. As a result, the data are also presented in this thesis in each of the analysis chapters, where relevant to the description of those analyses and to demonstrate the empirical basis for the arguments. While detailed data are thus provided in the following analysis chapters, the aim of this chapter is to provide sufficient overview of the cases to give the reader a sense of each case as a situated phenomenon. Data are therefore presented in a limited fashion and, where it assists in this aim, with further elaboration provided in the subsequent chapters.
Overview of unit case similarities

All of the units were in the same Australian metropolitan university and in the same faculty. As a result, and not surprisingly, there is repetition of some data in the context and people categories. Rather than elaborate these variables separately, to avoid unnecessary repetition and to set the scene, the first section briefly presents the cases in relation to the context and people categories. Where empirical data were not collected for particular variables this is also noted.

Following those sections, the project cases are each described in turn. Where the data for the unit-level context and people categories showed variation at unit level, this is noted briefly as a foreground to the project case descriptions. Data regarding delivery structure are then briefly outlined, followed by descriptions of the projects from the most illuminating of the data sets. These emanated from four of the variables under the curriculum model categories of Presage and Process: Project Scope, Intended Learning Outcomes, Scaffolding and Roles. In each case, further data drawn from the Product category is compiled from the variables as ‘Assessment evidence, criteria and methods’.

Context

As noted above, all of the cases were based at the same university and within the same faculty. As such, they shared a number of features relating to institutional and administrative structures including overall approach to curriculum design, resources, required reporting and class scheduling. The organisational structure included a 12-week semester, with two semesters each year. There was also central timetabling of classes, and set program structures with four units of study, at 12.5 credit points each, comprising a full student workload for each semester. Teaching rooms were centrally allocated and designed for general use as classrooms. This limited the way in which spaces might be occupied by the faculty. Most commonly, units were allocated three hours teaching time each week, although Unit A, as will be seen, had double this allocation of time and was also worth 25 credit points.

All of the cases in this study were set within three-year undergraduate degree programs with optional one-year industry based study, taken as the third year of a program. Students undertaking the one-year industry placement option were required to complete their degree by taking a one-year honours program at the conclusion of
the placement. All of the programs also had similar general outcome goals, focused on professional practice, practical design outcomes and project based learning approaches.

Each of the cases came from a different program or program area. Unit A was a unit in the interior design program; Unit B in graphic design; and Unit C an interdisciplinary elective unit shared between all the design programs. These differences in discipline derivation were among the criteria in the purposive selection of the cases. A second key criterion for the choice of unit for the research study was variation in the year level. Unit A was a third year unit, Unit B a first year unit. Although Unit C was also a third year unit, it was a second unit in a series introducing students to design management concepts. These criteria were selected in order to capture commonalities across the disciplines and potential variations in patterns of delivery related to expectations around the learning outcomes at differing levels of the programs. Further details of these differences are provided in the case descriptions.

**People**

In each of the unit cases, there was an academic staff member (teacher) responsible for curriculum development, teaching and assessment. While contract teachers were also employed to teach additional cohorts of students, the study did not include the work of contract teachers excepting where classes were brought together for particular activities. Contract teachers were also not interviewed for the study. In Unit C, I was one of three academic staff members teaching into the unit. Although I was not responsible for the overall curriculum design, as an academic staff member I was able to make significant changes to the curriculum at delivery level. The other academic staff members teaching the unit were not included in the study.

While only limited data were collected regarding teacher experiences and beliefs, during the interviews teachers in Unit A and Unit B reported on their previous relevant experiences. All three teachers involved in the study shared some characteristics. For example, all had similar levels of professional and teaching experience, having started professional life in design practice and having had between seven and 12 years of undergraduate teaching experience in a university environment. Each of the teachers had worked in specific discipline areas, although the teacher in Unit C had also worked in multiple design discipline areas. In addition, all had professional
experience related to the curriculum in the unit. In the judgement of the researcher, the level of experience of all teachers indicated a reasonable level of expertise in both the professional practice and educational aspects of the units.

Beliefs held by teachers regarding educational processes and learning outcomes were recorded as part of the interview data. In all cases, teachers argued that projects were the most appropriate and authentic means of achieving professional capabilities. For example, the teacher from Unit A argued that ‘students have to learn through doing the whole thing and seeing whether they have done well or not’.

Projects, as a curriculum method, were generally agreed to involve ‘testing of learning through stages’ (Teacher, Unit A); being about ‘processes as much as about the content’ (Teacher, Unit B), and; ‘allowing students to experience the learning’, ‘own the work and make choices about what matters’ (Unit C journal notes).

While all of the teachers, including myself, were comfortable with projects as the basis for learning in design education, there were some variations in the way that the overall learning context was described. In the interview the teacher for Unit A argued that projects carried out with studio-based and apprentice-style teaching methods based on architectural education practice were the most appropriate means of teaching design. The teacher further stated that the model was ‘synonymous with deep learning’ and had been the traditional method ‘for good reason’, but was constrained by standardised rooms and class scheduling which ‘leaves nowhere students can work alongside one another’. In Unit B and Unit C, the teachers described a more general need for structured activities to support learning, but changing shape depending on the context and aims of the curriculum. In these cases, there was greater emphasis on structured planning and curriculum, rather than a single approach. For example, in the interview the teacher for Unit B argued that ‘you always have to make changes as you go along’, and that each instance of curriculum delivery was to some degree unique: ‘it’s all about planning, being responsive, working out what level it’s at, what the students need and matching that with what you want to achieve’.

In Unit A, the teacher reported that the primary role of the teacher would be a combination of expert and acting as proxy client. The teacher in Unit A further expressed expectations that students would work independently, and should be able to gather their own learning resources as appropriate to the creative direction taken
and degree of progress: ‘Students need to find what they need. They should know how to find important information’ (Unit A teacher interview).

In both Unit B and Unit C, there was a shared expectation that the teachers’ role would involve facilitation and structuring of learning opportunities. All three teachers expressed expectations that students would work outside of class time to continue project development, that they would independently seek resources outside of those explicitly required, explore many options before selecting final paths to pursue, and have a highly engaged attitude to design that would inform the outcomes of each project. Each teacher also expressed a preference that students would have completed related units of study, but also acknowledged that students could come from a variety of backgrounds. This included pathways from different programs or through recognition of prior learning processes.

There were a total of 68 students enrolled in the instances of the units investigated for the study. For reasons of ethical approval and manageability, little data were collected regarding students’ prior experiences, other than those that could be elicited from the program documents, where entry requirements and expectations were described, and observation notes, where general information could be identified regarding the student cohort. The study scope, therefore, did not include significant empirical data regarding the experience, knowledge and expectations of students. However, some data regarding the student cohorts were public information so were available for noting. Specifically, the publicly available program and unit documents included some information about pathways into programs, prerequisite experiences and expectations of capability. Data from these sources indicated that the majority of students would enter the units having completed the faculty program in the recommended sequences. Nonetheless, it is likely that there would be some variation in experience for individuals, and that previous or concurrent experiences in educational, personal and professional life would have some impact on individuals. Students entering at the first year of the faculty programs have a homogenous experience within those programs, excepting for those students in Unit C, where the student cohort included students from across the programs. No specific data were recorded regarding students’ prior knowledge or expectations other than that indicated by events within class sessions. Furthermore, that data set was not sufficient to come to detailed conclusions about student expectations.
Cases

Unit A

As noted in the previous section, Unit A was a third year unit in the interior design program. The teacher had substantial experience in architectural practice, and reported her own learning experiences in architecture as being studio-based. The teacher also held strong beliefs that the studio environment was the most appropriate context for design education. The teacher further reported that the scheduling and environment constraints on the project were negatively implicated in its delivery.

Strict entry requirements in this program effectively limited the breadth of previous experience that could be claimed for entry with exemptions. The student cohort was made up of students who were in their final year of undergraduate study, and who were generally expected to have completed two years of previous study in the faculty, with some exceptions where students had entered the program having gained exemptions for prior study elsewhere.

The unit was delivered with six hours of contact per week (twice that of the other units in the study). It therefore comprised half of the student workload for the semester. The class group was also smaller than in the other units, with 12 students enrolled for each class group. Contact was scheduled as two three-hour classes each week, in a multipurpose classroom in the faculty. No lectures were scheduled.

There was only one project in this case, referred to as A1.

Project case description: A1

This project was allocated 100% of the assessment grade for the unit, and ran for the full 12 weeks of semester, with an additional two weeks in which students could complete work prior to assessment.

Project scope

In the interview, the teacher described the overall aim of the project as preparing students for professional practice, and in particular, as being a culminating project which would allow students to refine their professional skills. The project involved the design of a six-storey library building for a real site in the metropolitan area:
‘This assignment is an exploration of the [given architectural concepts] as a challenge to designing interior spaces for a small specialist library, as a specific typology of space, and, to using light and space within a pragmatic spatial planning program. The library is to be an inclusive repository of books art and film, and will be used a bit like a society. It will be a place to meet, discuss and exhibit ideas’ (project brief)

Taking into account function, user experience and aesthetics, students were expected to complete full schematic designs and models for all six levels of the building (including the interior and exterior architecture), as well as technical reports (including building specifications). There were a number of complex and interacting dimensions of the problem. There were several user groups and audiences for the work. Namely, library staff, library users with differing needs, and a professional panel who would provide feedback to students during assessment. The two distinct user groups were shown to have specific and sometimes conflicting design needs. For example, taking into account staff needs for privacy and working areas reduced the accessibility for library users and the availability of services.

The site was narrow and constrained by multi-storey buildings abutting three sides, representing constraints to the design in relation to the construction process, orientation of the building, location of services (including both utilities and services such as lifts) and management of egress and accessibility. Lifts also had to be incorporated in the building, as did sufficient space for disabled access to all areas. There were thus multiple complex problems to be worked through by students with limited input from the teacher. Each of the problems also interacted with other aspects of the design requirements. More specifically, the use of light was complicated by the need for private areas, stacks for books and meeting building specification requirements.

There were few controls limiting how students addressed these problems. Those that were in evidence were largely linked to a series of project stages, and the need for compliance with professional rules or principles, such as building regulations or best practice. However, students were expected to gather information about these controls for themselves. This meant that they were also required to define problems as they arose, and work through details of each problem balancing the tensions between each of the considerations. Indeed, during the interview, the teacher argued that ‘this project has a degree of difficulty and challenges, particularly the technical’.
All of these technical issues had to be balanced with aesthetic and user experience considerations.

**Intended learning outcomes**

In the intended learning outcomes, it was expected that students would be able to demonstrate an understanding of user needs through the design outcomes. This was confirmed by the teacher during the interview as a need for students to ‘have empathy with the user’. It was also explicit in the unit outline and project brief, where learning outcomes included a need for understanding of the ‘sensory experience of space’ and a list of staff and user spaces, including staff and visitor areas, each with specific purposes.

The knowledge required was also presented in the learning outcomes as a broad and deep knowledge of the field, including principles of design and procedural knowledge. Students were expected to carry out critical inquiry in all knowledge domains pertinent to their work, and to be able to draw on knowledge and understanding of the field sufficiently to apply concepts consistently. There was also an expectation that students would acquire sufficient depth of knowledge to be able to compare positions and argue for their approach and solutions, described in the unit outline as a learning outcome: ‘… effectively explain the project rationale, the research which has informed the design and the methodology used to develop and resolve the final proposal’.

Key to the learning outcomes were concepts of independence, engagement and exploration. According to the unit documents, students were expected to work independently in their design development, specifically, to ‘familiarise [themselves] with the opportunities and constraints of the site’ (project brief). Students were expected to gather their own resources to support decision-making and to develop their own direction with minimal guidance. In the interview, the teacher stated an expectation that ‘students have to figure out what the issues are and address them by trial and error and using previous experiences, logic and principles’.

Nevertheless, there was also a strong emphasis on the need for students to take into account feedback, both through their own sense of project progress and from others. In particular, students were expected to continue to refine designs through iterations of development based on self and teacher analysis of progress, demonstrating ‘design authorship … through a commitment to taking individual responsibility for
reconsidering/refining the work in response to critical feedback’ (unit outline). This approach was expected to lead to differentiation between projects, and a need for individual support rather than detailed learning resources.

All of these learning outcomes were defined by the teacher in the interview as being related to the project being in the final year of undergraduate study, and acting as a ‘transition to their first professional work’. The teacher further argued that the best students would demonstrate ‘mastery’, ‘individual artistry’ and ‘sophistication’ in their work, as judged by expert professional architects.

**Scaffolding**

The project was organised into loosely defined stages, with general deadlines. These deadlines were not necessarily adhered to, with no specific related assessment nor consequences if students failed to meet them. Stages, as described in the project documents, comprised a first exploration of the site and constraints, sketching drafts of designs, first detailed schematic designs with building specifications, and finally, full designs and specifications. Only two specified and directed project tasks were noted: carrying out a site review, and a light study. Some scaffolding support was available to students regarding the processes that would enable identification and testing of problems and potential solutions. For example, students were prompted to establish how light would be constrained in a building on the site by undertaking a ‘light study’ – a photographic record of the site and a cardboard model of initial proposals.

During classes, scaffolding support for the project was centred primarily on discussions between individual students and the teacher, referred to as ‘critiques’ or ‘work-in-progress’ meetings. This notion of student responsiveness and independence were echoed in class sessions, where problems were raised but not resolved by the teacher, and suggestions were made regarding a need for students to revisit problems themselves. For example, in the second session, notes on individual consultations show the teacher advised students to ‘go back to the problem’ and raised concerns about individual students having ‘gone to the model early’. Further, third class session observation notes record that students were reminded that they needed to do more work on the development of their design: ‘students to look at more designers’ and ‘improved designs required for next session’.
There were no knowledge resources supplied except a presentation of exemplars given by the teacher in the first week of the project. There were also very few set activities. In the second half of semester, three presentation sessions were scheduled. However, these only involved presentations by 4-5 students in each session, and two of these were curtailed after two presentations. As on two occasions the same students presented, not all students presented work during semester. There were also two ‘pin-up’ sessions, during which students arranged their ‘work in progress’ around the room, and the teacher led a discussion of the strengths and weaknesses of each. Observation notes for those sessions showed that these were described as being ‘as if it was a professional job at first review’ (session two). The focus of these sessions tended to be on the skills of presentation, in particular, the teacher is recorded in observation notes as talking ‘through ways of articulating and developing the work’ with much of the discussion being centred on an expectation that students are able to present well and fluently, and specifically, ‘be able to talk about the history, place, rationale and decisions made’.

As demonstrated by the teacher’s expectations and consistent reference to independence, the overall emphasis was on independent study, supported by ongoing work in progress discussions with the teacher. Individual meetings with students were the primary feature of the scaffolding, occurring in every session. The time constraints meant that in a single session, the teacher was able to review progress for 5-6 students. The process tended to be carried out in the same order each week, with not all students getting feedback every week. In the latter part of the semester, class sessions were interspersed with appointments for individual consultations.

**Roles**

The teacher set the overall pattern of activity for each session, and for the project as a whole. As noted above, instruction was dominated by individualised feedback to students on work in progress. Observation notes show that in consultations the teacher was the dominant speaker, providing critique of the work to date. Observation notes also show that the consultations varied in nature, with questioning regarding decisions and work undertaken, reiterations of requirements, and advice about further work. For example, in the fifth week of the project a consultation is recorded in the observation notes as involving the teacher identifying problems with articulation, directing thinking, asking the student to ‘explain drawing’, then identifying
'problems with technique', and demonstrating 'correction'. There were also occasions on which critique of an individual student's work was shared with the group. In particular, observation notes show instances during work in progress consultations where the teacher 'calls all students to view a student’s work' (session two). Again from observation notes, there were instances of both positive and negative critique during these events, although more instances (12) of negative critique than positive (3) sharing of individual critiques were noted. For example, in the pin up activity in session six, notes record that a student had made incorrect calculations and failed to complete a task at an appropriate point in the project. As a result, the teacher called the group’s attention to this and reminded them that they should ensure that they did not make the same mistake. Similar patterns were noted during each of the student presentations, in which the teacher tended to begin talking early in the student presentation. Specifically, providing students with feedback and redirecting information about requirements, or the lack of student work meeting requirements, to the group. The high levels of feedback provided to both individuals and the group were well in line with the teacher’s view that in design education, particularly in the studio, ‘teacher feedback is given constantly’, and that this constant feedback is an integral part of the design learning process.

In line with the goal of independence and the desire for individualised outcomes, students completed the bulk of work outside of class times and made decisions about the content of their projects independently. Nonetheless, during class sessions students tended to be passive participants in the consultation process, awaiting the teacher’s conclusions. They also appeared to be uncertain about decisions, and seemed to wait for direction. Students did not voluntarily comment or provide critique during the presentation or pin-up sessions. When asked to comment on their work and justify decisions in the individual consultations, they tended to use vague terms and to be extremely brief in their replies. For example, in observation notes for session five, when asked by the teacher to comment on another student’s presentation, all students remained silent. Another student, in the same session, was asked by the teacher to explain why a particular piece of work was effective, but the student did not reply. The teacher then spoke about the features of the work in relation to the presentation format. During observations and in the interview, the teacher expressed frustration regarding the progress of the student group and their capacity to engage with the project, citing in particular a lack of discussion and self-regulation, and stating that students did not ‘work between classes or commit’ and
needed to pay attention to ‘doing more work’, including ‘discussing each others work – they should be talking about their work between classes, testing ideas’.

Assessment evidence, criteria and methods

The project was submitted for assessment in week 14. There were no formal interim assessment processes and the formal assessment of the project was therefore entirely summative. Assessment evidence for the project was a portfolio of completed designs and a technical (building specification) report, along with a selection of developmental design work, and models. Although a workbook was required, this was not in any particular form but rather a series of documents produced during design development, as the teacher noted during the interview, ‘We like to have the workbooks because it forces students to show work over the time and so we can see that they have tried to solve problems on their own’. There were no adjunct tasks, such as journals, required other than those chosen by students to demonstrate their development in the final portfolio and workbook. Thus, the learning experience was focused singularly on design development and articulation, with emphasis on the artefact.

Students also presented their folios to a design jury on the day of submission. The design jury was comprised of professional architects, the teacher and a contract staff member also involved in teaching into the unit. The design jury process involved students providing a verbal and visual presentation of the work, including rationale for solutions, and followed in each case by a question and answer session in which the jury interrogated the work and asked for an oral defence. In the interview, the teacher argued that ‘it’s got to be industry quality – our panels are the best indication of whether the work is good. They present, and it affects their grade but not clearly’.

Criteria listed in program documents included compliance with technical requirements, visual and verbal presentation styles, design quality, aesthetic quality, flexibility, revisions, attitude, engagement (with the user and with the ‘spirit of the project’) demonstration of skill and creativity and completion of stages. Originality was also important, as described by the teacher during the interview: ‘the mock ups are evidence of how well they have dealt with the problems and how original and exciting their ideas are’, but in itself, originality was also expected to be balanced by strong technical skills ‘the technical knowledge has to be good too – otherwise it will stand out as a good idea that just won’t work’. These criteria were balanced as part of the
process of grading rather than formally weighted. Nonetheless, during the interview, the teacher emphasised that evidence was sought of responses to feedback and ability shown in adjusting designs to address emergent problems, described as ‘a good attitude to learning’ and ‘real engagement with design’. There was also emphasis in both documentation and during the assessment process on overall design quality and aesthetics. The expectations were that students would produce outcomes of a professional quality and in addition, that these would be innovative in their approach and execution, have an artistic quality and inspire admiration.

Weighting was, however, given to outcomes from project stages. These were sketch-diagramming (30%), development of ideas (20%), documentation (including final designs) (40%), formatting and visual presentation (10%). Following the jury process, the project portfolios and models were laid out in a room, and the teacher allocated final grades using a standard form which provided space for grades against each of the project stages and additional space for written feedback. Formal moderation was limited to a review of the unit grades by the Program Coordinator, but did not include a review of the project portfolios. In the teacher's view, the group had not achieved the expected standards, as noted in the interview: ‘except for a couple of students who really committed to their work, most of them just didn't do enough work to reach the standard.’ The poor quality of outcomes, as perceived by the teacher, was argued to be the result of a normal fluctuation in cohort capabilities across instances of unit delivery.

Unit B

Unit B was a first year unit in the graphic design program. The teacher had substantial experience in graphic design practice and teaching experience in a variety of learning environments. The teacher also reported a preference for highly structured curriculum in the earlier years of a program and a belief that teachers should be responsive to student stage of learning and provide comprehensive scaffolding in the form of knowledge resources and opportunities to practise skills.

The student cohort was comprised of first year graphic design students, in their second semester of the program. Most students would have completed the first semester of the program, which included an introductory unit, described by the teacher as providing the basic skills that would be built on in this unit.
The unit was delivered with three hours of contact per week, making up one quarter of the student workload for the semester and standard size of a unit in the faculty. There were 24 students in the group. Contact was scheduled as one two-hour class session and one one-hour lecture each week. Classes took place in a multi-purpose classroom in the faculty building. Lectures were held in the lecture theatre.

There were three project cases in this unit, referred to as B1, B2 and B3. Each is dealt with separately in the following sections.

**Project case description: B1**

B1 was allocated 15% of the unit grade, and was carried out over a three-week period, including one week allocated to submission of the work and briefing for the subsequent project. There were, therefore, two weeks of classes allocated to project activities.

**Project scope**

In the interview, the teacher described the project as one in which students would ‘practise basic professional skills using the first stages of communicating word concepts with images, and putting together a basic print-based presentation’.

The teacher further expressed an intention to initiate students into a way of working that involved discrete steps, negotiating meaning and gathering materials in an organised manner. In contrast to A1, the project was structured as a set of activities, with little overview given in the unit outline or project documents. The activities also formed stages. First, working as a group, students generated word concepts initially around responses to designs (generating activity). These words were then used to generate meaning through mind-mapping exercises carried out during class (mapping activity instruction), and their meaning discussed (definition activity). Visual representations of those concepts were then gathered (referencing activity). Individuals submitted six pages of their exploration of the visual expression of the originating word, with a group submission of an edited set of images (editing activity).

The project thus required no complex integration of parts, with linear progression between simple steps in developing the outcomes. There was no external specific audience to whom students should orient their products, other than the assessing teacher. The topics and type of products were within a very narrow range with only
some scope to select images that best represented the word or expression. Decision-making was thereby restricted to completing the tasks as described in the process of selecting words and images. The aim of this work, as described by the teacher during the interview, was to ‘help students learn to do basic design tasks’, and to ‘get to know each other’ in preparation for later projects, while also enabling students to move from conceptualising design as a personal process, to design as communication, and ‘to explore and expand on […] visual vocabulary’ (from the project brief).

**Intended learning outcomes**

Accordingly, in the intended learning outcomes, there was a strong emphasis on the achievement of basic skills. Specifically, carrying out staged development and iterative design processes on a small-scale project; working in sets of images; designing a basic visual communication; and laying out a structured visual document. The aim, as described during the interview, was ‘practising the basic communication and workflow skills’ while in the project brief, the project was described as being ‘primarily about function, and that function is communication’. There were also repeated references to activities linked to students getting to know one another. For example, ‘discuss, explore and record’ (generating activity instruction), ‘discussion in groups of 3-5’ (mapping activity instruction), ‘discuss the meaning’ (definition activity instruction) and ‘bring .. for presentation to your group members’ (referencing activity instruction), following which, selections of images were ‘chosen by individuals but negotiated using feedback’ by the group (editing activity instruction).

Students were expected to think through their communication ideas and strategies in relation to self-expression and a broadly imagined audience; and be prepared to gain inspiration and resources from a range of locations. The knowledge domains were thereby limited to identifying sources for, and selecting appropriate, visual representations. Only basic technical knowledge was required in relation to the use of print design software within the templates. There was no requirement for students to justify or argue for their outcomes. Greater emphasis was given to compliance with requirements in the outcome submissions. This expectation was reinforced in each activity instruction. In particular, following instruction and compliance with requirements was emphasised in the project brief, with tightly defined and detailed expectations around the format and content of outcomes including the provision of templates, use of particular fonts: ‘ITC Franklin Gothic’ and presentation of images.
Each student in the group is to present four images, each image should be 60 x 60 mm, RGB, 200ppi, High quality JPEG, and add the names of the students in the group 'first' and 'family name'.

These learning outcomes and requirements formed the controls for the project, and the basis of scaffolding of the work, as described in the next section.

**Scaffolding**

There was a great deal of scaffolding for the project. The teacher provided step-by-step instruction and reinforcement of both previous and next steps throughout the activities and at the end of sessions. The bulk of the project tasks were carried out within two class sessions as short, highly-structured activities. In the first class, two group-based activities were used to generate the expressions. As noted above, the first of these was a word mapping exercise, in which students explored synonyms and antonyms for, as well as interpretations and variations of, their chosen word. The second activity was a definition exercise in which students developed a shared definition of the word based on their word maps. Between the first and second session, students were required to individually gather images that represented their word. Instructions were also given for this: 'individually collect and document (photograph or photocopy) as many examples of graphic representations of your group's expression (word) as you can find. Any media or format'. In the second session, students edited a final image set for each group. After the second session, they were asked to put together their final image set for submission. Project tasks were, therefore, almost entirely the set activities for the classes, with the exception of sourcing images, which took place between sessions, and uploading submissions to the unit website after the second session.

Templates and examples were given for every activity and submission task during class sessions. Knowledge resources were also provided for almost every aspect of the project, including web-based examples of links between words and images, templates, lectures on visual communication, in-class presentations of principles and descriptions of processes. Along with the provision of information about compliance with requirements, there was a general focus in all of these resources on basic skills, personal expression and clarity of expression, along with the general principles of visual and verbal expression.
Roles

The teacher directed all activity in the project, providing schedules, structured activity, templates, resources and direction during and between activities and stages. Copious knowledge resources around visual communication were provided on the unit website, including essays and visual documents demonstrating the concepts discussed in class. As noted above, instruction was also provided at a high level of detail, including instruction on how to identify words, draw diagrams and select images, and how work should be constructed and presented. For example, in the instructions for the mapping activity, students were asked to use *the A3 format provided* and to *complete one page with four (4) graphic representations per student. Two copies to be presented in the one A3 sleeve*.

Observation notes show that the teacher tended to provide general whole of group instruction and examples, for example from session one: *first task is to fill the whiteboard with words. Teacher shows example of completed word list*, *students asked to call out words* and then *teacher asks students to think widely, to think of words they might use*. While some feedback was given to individual students or student teams on their progress based on student questions, this was generally in response to queries from individual groups, for example: *one group of students ask about what is expected for outcome. Teacher provides brief answer and checks understanding*. During this process, the teacher moved between groups, in each case asking how they were doing, giving examples and reinforcing directions.

Students carried out the required tasks and submitted work as requested during and between sessions. During class, they followed rules and instruction closely. While largely responding to instruction for activities, the students were also very active contributors to the class sessions. They sought clarification often and returned to topics to debate concepts, shared information with one another spontaneously and outside of their teams, and raised issues with the teacher and with the group during and between activities. This was evident in observation notes for the hour-long first activity, where students are recorded as interrupting and asking questions at four points, including while instruction was being given and during the activity itself.

Assessment evidence, criteria and methods

Assessment took place at the conclusion of the project, and was therefore summative. Evidence used for assessment of the project was a collection of images.
in a printed portfolio (using the provided templates) and a workbook comprised of the progressive narrowing of expressions and collections of unedited images. No weighting was given to any one aspect of the evidence. Although one of the activities was based on individual work, a group grade was applied to the final portfolios.

Assessment criteria were described in the project documents as completion of, and adherence to, the requirements, including correct application of the template; evidence that a breadth of representations had been explored; clarity of expression, insight and personal awareness; relevance of the representations; and stylistic and reprographic (printed) quality. Although not present in the documentation, in the interview the teacher reported that the workbook was used to "demonstrate learning in the form of exploration and compliance with expected processes". No weighting or emphasis was given to any particular criterion in the documentation or in the interview. The teacher allocated final grades following a review of the project outcomes. Moderation was limited to a review of the unit grades by the Program Coordinator, but did not include a review of the project portfolios. In this case, the teacher reported that the students had achieved 'reasonable outcomes in the context of this project', and that there were 'normal variations' in quality.

**Project case description: B2**

B2 was allocated 60% of the unit grade. In the unit outline, 11 weeks were allocated to the project. The full briefing for the project did not occur until week three of semester, reducing the time frame. Half of the contact time allocated to this project was also dedicated to content for B3. Accounting for this cross over and for submission one week after semester end, there were approximately five weeks of contact time and seven weeks' worth of workload allocated for students to complete the project.

**Project scope**

In the interview, the teacher described the overall aim of this project as mimicking a real professional brief, providing students with an opportunity to 'practise professional tasks in sequence', and to understand 'what we mean by effective communication and the levels of communication in a piece of visual work'. More specifically, in the project brief, the overall scope of the project was described as:
'This brief first of all requires you to conceive and propose a ‘Boost’ event featuring an Australian designer, then [to] express and execute the promotional material for such an event.'

In the project brief, three phases of development were described:

- Identifying and documenting suitable designers
- Writing a creative proposal for the event which revolves around a specific designer, their knowledge and experience
- Exploring, proposing and developing the communication based solutions, in a variety of formats and media

In effect though, the project involved four stages. As per the project brief, the first stage was gathering information about local designers and their style of work. The second stage was the imagining of the promotional event for their work and creating an outline (what, where, when) event plan. The third stage, as described in the project brief, was the design of an overall visual style for marketing materials. However, in the observation notes, this was divided into two clear stages: using the visual style in two documents – a flyer and a poster; and translation of that style into a folded item that could be mailed out as an invitation or marketing device. There were thus several sequentially linked parts to the project.

Complexity between the parts of the project was related to the challenges associated with translating a visual style into more than one format, along with incorporating and ensuring the readability of required textual information. The audience for the project was young designers, a group similar to the students themselves. Problems encountered, and that students were expected to address, were the creation of a visual theme related to the designer’s work, the continuation of that theme across the marketing items, and the challenges of creating novel designs for an item that needed to be posted.

Limiting the complexity of problems to be solved, print templates were provided for both the poster and the flyer. Students were also provided with a list of the textual information that needed to be incorporated into the visual work. The mailed invitation was more complex: made from paper or cardboard, students were expected to investigate and select ‘novel’ folding techniques while maintaining the features of their overall design concept and meeting postal requirements for size, bulk and stability. Reinforcing the aim of exploration, students at each stage were expected to
develop several concepts or options from which one would be selected for further development. For example, in the first stage, students selected four designers and were allocated one of these. In stage two, similarly, students presented four draft event proposals for review. While not explicit in the stage three documentation, in both this and stage four observation notes show that the teacher emphasised that students were expected to develop multiple variations (up to 20) of designs for discussion before making further refinements.

**Intended learning outcomes**

Intended learning outcomes for B2 were largely focused on investigative and visual development skills. As described in the project brief and by the teacher during the interview, students were expected to ‘acquire knowledge of the work of local designers’, ‘basic visual communication methods’, and ‘issues faced in the development of marketing materials’. Further, in the interview, the teacher described an expectation that students would demonstrate capability in ‘carrying out an investigation and developing a visual communication in multiple media, targeted at a specific purpose and for a named audience’, and presenting a ‘persuasive’ visual outcome. Although it was expected that students would have more ‘time to try things out and discard ideas that don’t work’, the teacher argued that ‘this isn’t the same as the honours projects where students set their own brief more or less’. Activities were used to structure the process and students were not expected to have open choice or deal with a great deal of complexity: ‘we set the topic area and types of outcome with some choices about specific forms. Students make decisions in the gaps between these’. Students had very little latitude regarding the decision-making for the content or format of their projects but were required to work under supervision and to demonstrate compliance with expected processes and templates. In this way, independence was largely restricted to locating and using conceptual and material resources, developing concepts, and refinement of visual designs within the provided framework.

The knowledge domains were limited to the application of a provided knowledge base in design processes and print production to an imagined situation. Students were expected to gather information about a designer, and to apply this to an event concept. This knowledge was largely situational and procedural, focusing on the location of easily available information and its application to a visual concept with consistency. Basic technical knowledge was required in relation to the print
production aspects of their project, and the use of design software, with some stretch goals in relation to the development of a folded mail item. There was no requirement for students to justify or argue for their outcomes. They were, however, expected to demonstrate responses to feedback by reworking concepts when provided with critique. In summary, intended learning outcomes focused on the ability to follow instruction, use basic design software, explore ideas, respond to feedback, undertake self- and peer evaluation, use iterative development to improve their work, and to produce conceptually linked, persuasive and aesthetically pleasing visual designs.

Scaffolding

The class sessions were highly structured initially, with activity-based instruction in the first three sessions, during which some project tasks were carried out as set activities in a similar manner to that found in B1. These were more lateral than those used for B1, and associated with the consideration of links between designer’s work, possible events, marketing concepts, audience and visual styles. For example, in session three, students worked in groups to identify expectations around visual communications that would bring people to an event. This resulted in a list of key words that should be taken into consideration in the designs, such as: ‘entertaining’, ‘exciting’, ‘persuasive’ and ‘curious’. Activities were also related to gaining feedback on progress. For example, in session two, students presented information about their chosen designer and outlined possible directions for an event to the class, and were provided feedback on their choices by peers and the teacher.

As noted above, the project was organised in defined stages, which also set the pace for work. Of particular note, in the project brief, there were instructions about what students should not be doing in the early stages of the project. In stage two, instructions about the development of the event concept included instruction that students ‘should not be designing the communication outcomes – but the event these outcomes will be based on. It is literally the foundation, and you need good, strong, solid, well-built foundations’. The later visual development stages of the project were less structured, allowing students scope to explore and refine their visual designs. From week four, students worked largely independently on their projects.

Class sessions dedicated to the project included two sessions involving individualised feedback and one session involving a peer review. The sessions dedicated to individual feedback were structured in an identical manner to those found in A1. In
other words, students were expected to continue their project work, while the teacher reviewed work in progress with each student. The peer review session involved students bringing in their folio of draft work. Students then were provided with a grading sheet with the assessment criteria and asked to provide anonymous grading of one other student’s folio. Observation notes show that the students were the sole providers of feedback around project outcomes during this session: the teacher did not comment on the work. At the conclusion of the feedback process, the teacher led a discussion about responses to feedback and challenges of assessing work. One further session involved teacher-led discussion and presentation of examples demonstrating the challenges with translating design to folded mail items, possible techniques for creating interest, and possible material choices.

As with the previous cases, the teacher actively encouraged students to share progress and questions, and to discuss work outside of class in addition to formal presentation and group discussion activities. During the final three weeks of the projects, the teacher additionally allocated each student to an informal feedback partnership. This strategy was not described in the project brief or teaching materials, but in the interview, the teacher described the role of the students in the partnerships as ‘to provide feedback and support’ as students neared the end of the process and carried out ‘final refinements to their work’. The teacher also described the benefit to students in providing feedback: ‘it also helps them to critique their own work … benchmark how they are doing against their peers’.

In addition to the activity, teacher and peer supports, there were copious knowledge resources supplied for the unit. Students were given access to documents covering visual styles, print design principles, marketing and materials via the unit website, although they were not required to make use of them, and indeed, were encouraged to find their own. Lectures also covered all of the topics raised in the project and focused on the procedural elements of design, along with presentation of example design solutions. Finally, templates were provided for project outcomes, excluding the mailshot item.

Roles

As noted above, the first sessions related to this project were structured, with later project work being carried out largely independently. The teacher, accordingly, directed early activity in the project, providing schedules, some in-class tasks,
templates, and resources to the whole group. During activities, the teacher provided precise instruction on requirements, gave examples, raised issues that students should consider and explained processes. Even during the later stages of the project, while the students worked on their project development, the teacher gave general whole of group direction during and between activities and stages, and prompted students with reminders regarding next steps and deadlines. For example, in the fifth session allocated to this project, the teacher: ‘reminds them they will need many ideas, will need time to think about it’. The teacher also responded to an apparent slowing in progress by providing further input. In the interview, the teacher expressed a perception that some students had ‘slowed down a bit’ between stages three and four of the project, but that they ‘figured it out in the end. Just needed more input and some reminders’. In the following session, the teacher talked ‘…them through where they should be up to … visuals [are] needed for a clear idea presentation’, and reminded students to ‘…start fleshing out [visuals]’. As recorded in the observation notes, at this point the teacher gave further support to the mail item development by using examples and working through the considerations that students should be taking into account: ‘shows students own box of resources … talks through design elements and rationale linked to themes for current project’.

The teacher was also the dominant speaker in individual feedback sessions. The teacher tended to provide advice regarding potential solutions during these sessions but also asked questions about student perceptions of, and rationales for, decisions. For example, in the first recorded consultation for session six of this project, it was noted that the teacher first asked ‘specific questions about the event and the designer’, then ‘paraphrases and reads main points from proposal document’. Student rationales were then commonly incorporated into suggestions for further work. In the same consultation, this process involved the student describing their resources and development of concepts, followed by the teacher asking if ‘these support the concept’ and reiterating connections between the event and the concepts presented. In a similar fashion to that found in A1, the teacher spent some time raising problems that needed to be addressed. In the consultation described above, this involved specific issues with formats, and suggestions by the teacher that the student review possible formats. Unlike in A1, the teacher also provided advice or options regarding potential solutions. This took the form in the same consultation of a discussion around features of the event, following which the teacher indicated ‘how connections might be made’ by working through the logic of the design: ‘the idea of a
CD connects to the designer working for bands, and bands playing at the event … suggests that other elements should be incorporated, i.e. designer works in fashion too’.

Students carried out activities as instructed, and tended to wait for further instruction before moving forward in the early part of the project. In the latter part of the project they tended to work more independently to develop ideas, but also maintained the stages as set by the teacher, awaiting instruction at each. As in B1, students carried out the required tasks and submitted work as requested during and between sessions. During class, they followed rules and instruction closely and did not alter or request further information other than clarification on minor requests. Similarly, they were also very active contributors to the class sessions during activities. They sought clarification often and returned to topics to debate concepts, shared information with one another spontaneously and outside of their teams, and raised issues with the teacher and with the group during and between activities. There was insufficient data to determine whether students actively engaged in the peer partnerships. However, during class session discussions there appeared to be ongoing engagement with each other’s work, suggesting that there was continued peer engagement outside of classes.

Assessment evidence, criteria and methods

Assessment took place at the conclusion of the project, and was therefore summative. Evidence for assessment was a portfolio containing the event plan and three marketing items. As in B1, students were expected to keep a visual workbook of developmental material. In this case, the project brief and observation notes suggested that the workbook should include collected examples of the designer’s work, drafting of visual themes, trials of translation of the ideas to multiple forms, and any other source material, notes and reflections collected during the design process. While the workbook was submitted as evidence of learning, it was not explicitly assessed.

No aspect of the portfolio was specifically weighted in the assessment. Nor was weighting given to any particular stage or product. According to the project brief, criteria for completion were the production of all items and compliance with requirements, including use of the template. In addition, project documentation listed extensive criteria. These were: the application of formal design considerations, use of
materials, technical design competency, relevance of the visual designs to the designer and the event concept, appropriateness for the audience, creative interpretation, exploration, link to research, overall quality of execution and visual presentation of the outcomes. In the interview, the teacher further emphasised that technical competency was the baseline requirement, and that there were three overall areas of significance: ‘aesthetic qualities, strength of the concept and effectiveness of the communication’, going on to say that work should be ‘quite well refined and use a visual sensibility … that should also match the concept and the designer’. In a similar manner to B1, in the interview the teacher reported that the workbook was used to demonstrate learning in the form of ‘exploration and compliance with expected processes’. The teacher allocated final grades following a review of the project outcomes. Moderation was limited to a review of the unit grades by the Program Coordinator, but did not include a review of the project portfolios. The teacher reported that project outcomes showed normal variations in standard, but that ‘on the whole the work was good’.

Project case description: B3

B3 was allocated 25% of the unit grade and. Although described in the unit outline as being carried out over four weeks of contact time, observation notes showed that students were given the project brief one week before the scheduled start and worked on this project alongside B2. Applying the same assumption as that applied to B2, this provided them with a total of approximately three weeks’ worth of class sessions and a total of five weeks to complete the project.

Project scope

In the project brief, this project was concisely described as: ‘develop a set of symbols that represent different teaching & learning activities’. In short, the project involved the development of a set of symbols in print variations. The teacher described the overall intent of this project as giving students experience in using design processes in sequence, but at a lower level and with less complexity than B2.

The project involved four stages as described in the project brief. The first stage was group-based activity, involving the discussion and generation of a list of ‘the different and distinct type[s] of educational experiences’. A single educational concept was chosen from these, and then extended into definitions and variations based on a ‘thought map’. During this stage, students were also expected to collect a large
number of symbol designs, showing at least 30 distinct styles, ‘for reference during this project’. The second stage involved the selection of four of the educational activity concepts and the development of a set of symbols expressing the chosen concepts in different visual styles. In this stage, observation notes show that the teacher encouraged exploration during this stage. This was also evident in the project brief:

‘the formal representational possibilities of calligraphic, organic and geometric shapes, as well as combinations and variations of form that would enhance the communicative aspect of either the form, function or context of the object. Consider also the gestalt principles.’

The third stage was the selection of a single style and the development of a set of four stylistically consistent and refined symbol designs relating to these concepts. Stage four was the testing and reproduction of the symbol designs in large and small scale, and colour and black and white. The final product of the project was this set of four symbols in variation laid out in a provided print template.

The complexity of this project was relatively low. While there was an expectation of exploration and generation of a large number of symbols and symbol types, once a style had been chosen, the symbols required only general iterations of drafting and refinement, and completion in print-ready form within the provided template. The audience was also only informally (in class sessions) and loosely defined as the general public. This meant that the requirements with regard to meeting audience needs were limited to readability and general communication, and did not impose a need for detailed understanding of an audience or user group.

**Intended learning outcomes**

Intended learning outcomes for B3 were largely focused on following instruction, with some latitude for individual visual direction in the latter part of the project. During the interview, the teacher described an expectation that students should demonstrate capacity in working through ‘problems related to visual communication of a concept’, ‘managing a single visual approach across more than one item’, and managing communication and print production challenges related to ‘graphic simplicity, reduction’. Technical knowledge was also emphasised, in relation to the use of design software, and the application of basic visual design procedures. There was also reference to design procedures and principles, indicated by the teacher in the
interview as a need for students to carry out ‘exploration and decision making in steps, adding to or changing design using the thinking processes of professional design’, and to ‘understand, abstract and synthesise information from examples’. Students were further expected to demonstrate qualities in relation to responses to feedback, as part of their development activities. There was no requirement to justify outcomes except through the presentation of development work.

Scaffolding

The project was highly structured, including templates and detailed instruction about the format, typefaces, number and scale of outcomes. The stages were also short, with each stage taking place over no more than a two-week period. The entire project was also well-supported by a large number of knowledge resources available on the unit website, including examples of symbols, essays regarding visual communication, and technical guides for print production. Students were expected to access these and to be able to discuss the content, along with lecture topics, during class sessions. While refinement of designs was largely carried out between classes, many of the project tasks were carried out during class sessions. In each class activity, the teacher gave precise instructions about timeframes, tasks to be carried out, their context and required outcomes. In each case, examples were given that showed precisely what was expected. At the beginning and end of each session, the teacher guided between-class work by providing reminders regarding use of templates, tasks that should be completed and deadlines.

For example, in the first session, the teacher initially led a discussion about the nature of symbol design and the context and requirements of the project. The first task was then introduced, and students worked in groups to carry out brainstorming and concept (thought) mapping activities. In the second and third stages, there remained a strong emphasis on a mix of teacher-led, group and peer review activities, underpinning the requirement for feedback responses in the intended learning outcomes. For example, as recorded in observation notes for the third session allocated to this project, students presented drafts of their first symbol designs for peer review. This involved students putting their work on a board, each with a sheet for feedback. The teacher’s explanation, recorded in observation notes, suggested that criteria for judgement should focus on ‘clarity, function, communication (whether they understand the symbol)’ and ‘aesthetics – form including composition’. The students then swapped rooms with another class group.
Students were required to select three pieces of work for which they gave feedback anonymously and ranked their preferred symbol sets. At the conclusion of the feedback process, the teacher led a discussion about responses to feedback, including discussion around the limits of the feedback: ‘these are early sketches, [which] means it is difficult to give effective feedback’. Later in the same session, the teacher focused on aspects of the symbol sets that had been responded to positively in feedback, and the way in which symbols communicate meaning. This part of the session included both teacher and student discussion of potential solutions to communication problems. The pattern of teacher and student input continued throughout delivery of the project, up to and including the day of submission.

**Roles**

The teacher directed all activity during class sessions and, as noted above, provided detailed instruction for the tasks to be completed outside of class. The teacher also indicated during the interview that this project had a high level of explicit teacher control, where students would be provided the ‘number, type and concepts for symbols’ and thus ‘produce small designs to fit criteria’ but would not be expected to ‘define their own problem’. Observation notes show that the teacher also regularly stepped back from an instructive role and encouraged students to drive discussion and feedback to peers, within the framework of the structured activities. In the interview, the teacher referred these events as being related to a desire that students ‘operate in a community of practice’.

While project itself was highly structured and limited student decision-making, students displayed similar behaviours to those noted in B2. In the class sessions, they generally awaited instruction before taking action. In line with the relatively small-scale and high level of compliance of the project, it was noted during observations that students followed instruction closely. For example, in the third session allocated to this project, it was noted that students waited ‘quietly for teacher to say ‘start’ before acting on instruction’. However, students were responsible for iterative refinements of the visual aspects of their work, and displayed a higher level of self-regulation and independence than was found in B1. For example, there was evidence in student work that development was regularly occurring outside of class, to a degree beyond that given in task requirements. This was noted by the teacher during observations, and in the interview, where it was commented that students ‘surprised us with more options’. Reflecting the framework for discussion provided by
the teacher in each class, there were also high levels of discussion in class sessions and during activities. Observation notes for these sessions show that students consistently and confidently engaged in discussions and presentations, including interrupting the teacher or an activity to request clarification or prompt further debate.

Assessment evidence, criteria and methods

Assessment took place at the conclusion of the project, and was therefore summative. Evidence for assessment was a portfolio containing the final symbol sets in the provided templates, with an additional workbook showing gathered material, feedback sheets and developmental work. As with B1 and B2, the workbook was expected to demonstrate exploration and iterative refinement of designs, but was not formally assessed or weighted.

Similarly, no weighting was given to any particular stage or outcome of the project. According to the project brief, assessment criteria covered the ‘demonstration and representation of all referencing and process work, with emphasis on the exploration and development of possible solutions; exploration of shape/form variants, effectiveness and efficiency of the communication, suitability to purpose (functional), realisation and execution of concept, presentation – method and quality’. During the interview, the teacher suggested that although the criteria appeared to emphasise the workbook, more attention would be paid to the final product. In this respect, the design ‘execution’, referred to technical skill and capacity to refine images to a functional simplicity that would underpin the ‘aesthetic qualities of the work’. Further, the teacher indicated that it was particularly important for students to have used ‘visual themes and [to be] able to carry those consistently for a series of visual communications’. As with B1 and B2, the teacher allocated final grades following a review of the project outcomes. Moderation was limited to a review of the unit grades by the Program Coordinator, but did not include a review of the project portfolios. In this case, as with B1 and B2, during the interview the teacher reported that there were no concerns with outcomes, and that in some cases, students had achieved higher than expected levels of competence.

Unit C

Unit C was the third year interdisciplinary unit for which I was the teacher-participant. While the other teachers involved in this study had both developed and taught the
units, I was not involved in the development of the unit outline. Regardless, there was scope for adjustment of the way in which the project was delivered. Like the other teachers in this study, I had substantial previous experience in design practice. In my case, this was most recently as an art director and studio manager. My previous educational experiences had been fairly broad: including teaching experiences in studio-based design and fine arts, technical and theory subjects, at levels ranging from short course and vocational courses, undergraduate and postgraduate programs for a range of cohorts including teachers, designers and information systems students. Similarly to the teacher in unit B, my beliefs regarding teaching practice tended to preference facilitation and structured learning, involving a variety of scaffolding activities and resources.

The student cohort was primarily drawn from the graphic, interior, digital media and product design. As such, the students had a variety of prior experiences, although all the programs bore some similarities as they were in the same faculty. None of the students had previous experiences in explicitly management-oriented units, although some would have been likely to have aspects of design management embedded in their previous units.

As with unit B, the unit was delivered with three hours of contact per week, making up one quarter of the student workload for the semester and standard size of a unit in the faculty. There were 28 students in the group. Contact was scheduled as one two-hour class session and one one-hour lecture each week. Classes took place in a multi-purpose classroom in a building adjacent to the faculty. Lectures were held in the lecture theatre.

There were two projects in this unit, referred to as C1 and C2. Each is dealt with separately in the following section.

**Project case description: C1**

Unit C1 was allocated 60% of the unit grade and scheduled for nine weeks. One of these weeks was dedicated to final presentations and another was allocated to briefing for C2. This therefore amounted to seven weeks of contact time. In total, allowing for the week where C2 was briefed, and a further week allocated before submission of the final reports, students had nine working weeks to complete the project.
Project scope

The overall aim of this project, as described in the project brief, was to assist students to gain an understanding of professional design practice, with a ‘particular emphasis on the management of design projects’. In the brief, the project task was further described as:

‘You will be split into groups of four or five. You are effectively a small design consultancy who will be pitching for a design tender. In your groups you are required to design and develop a proposal to be presented to the client for approval. You will be competing with other design groups so your proposal must have flair but at the same time show your capabilities in project management, costs, teamwork and an understanding of the client’s business.’

The project was structured around a realistic tender briefing document, based on the concept of a government department call for community development funding proposals. Students were required to generate a project proposal for an event, service or project meeting a community need and aligning with government priorities in the form of a (real) state government vision statement. The final proposal document was to include a needs analysis, concept description and implementation plans, forming a justification for the proposal. There were also requirements to include details of the expertise of the team, project management plans, product advantages and detailed costings (within a AU$400,000 budget), thus demonstrating feasibility. Additional considerations were suggested in the project brief, including stakeholders (partners, suppliers and users), service life, income generation, costs of installation or maintenance and promotional activities.

Students were expected to identify the community need for their project, and to gather sufficient information to support their argument that the need existed and could be met with their proposal. Other than the demonstration of a community need and justification for the proposal, there was no limit to the project topic. In other words, the concepts could take any form. This was evident in student outcomes which included proposals for magazines, public events, playground equipment and public transport communication systems.

The project was structured as three loosely defined stages. These stages were not described in the project brief but evident in the lesson plans where there were distinct separations between types of project activity, and where expectations for delivery
points were noted. The first stage, taking place over a two-week period, involved organising team structures, investigation and initiation of first concepts, and the selection of the strongest concept for development. The second stage comprised further investigation and resource gathering, the development of the concept and construction of a rationale, costings and working through planning issues. This stage took place over three weeks. The final stage was the development of the proposal itself, and its presentation. There was a great deal of flexibility in these stages, with only informal expectations relating to submission and presentations of work in progress. As with A1, assessment was of the full proposal, meaning that students could revisit any of the stages to refine their work as needed.

There were several complexities among the parts of the project. First, the community need was not identified, requiring students to gather information quickly and to make decisions about what constituted a reasonable proposal concept. Secondly, the tensions between achieving the most effective solution for an identified need and managing feasibility and cost effectiveness meant negotiating between best and manageable cases. Thirdly, working in an interdisciplinary team meant negotiation of directions and working practices with potentially disparate discipline-based preferences. Finally, in addition to the requirement for detailed plans and descriptions of the proposed idea, the project required integration of several areas of justification, including sustainability, the aforementioned feasibility, marketing or promotions, evidence of a community need and evidence of meeting that need. The team also had to demonstrate an awareness of the perspectives of a funding panel, described in the project brief as the ‘client’. The project scope largely formed the controls for the project. In other words, students were expected to comply with the requirements of the brief. Guidelines were also provided for costing and proposal structures, but students were able to work differently if they felt it appropriate.

**Intended learning outcomes**

In the intended learning outcomes for the unit, there was a strong emphasis on qualities relating to independence and teamwork, including expectations that students ‘develop strategies for working more effectively in teams’, and ‘deal with conflict and develop negotiation skills’. There was an embedded expectation that students would demonstrate a high degree of self-regulation, self-evaluation and engagement, required in order to complete the project successfully. The intended learning outcomes also showed a clear preference for procedural and situational
knowledge, related to gathering and integrating information about the selected community need, along with working through concept refinements, planning and costing processes, proposal writing and presentation skills. Technical skills related to costing and planning, and presentation development, were also expected. All of these capabilities were collectively defined in the project brief as a requirement for students to ‘give the client an impression that you and your team are professional and competent’. Theoretical knowledge was more limited. The project brief for example, made no reference to theoretical knowledge areas. In the unit outline, there were, however, learning outcomes that included requirements for students to ‘understand’ topic areas. For example, ‘understand the relationship between design and business processes’ and ‘understand the concept and practices of design management’. In combination with the greater emphasis on capabilities showing the mastery of procedural and situational knowledge, these intended learning outcomes suggested a limited, and predominantly applied, theoretical knowledge base.

**Scaffolding**

As noted above, the project was broadly structured around loosely-defined stages. There were also lectures each week on related topics. The unit schedule shows that in the first weeks of the project, lectures covered team and design management issues and client expectations. Subsequent lectures covered costing and planning methods, presentation formats and aspects of the relationship between design and business strategy. A template was provided for costings, and guidelines were also given for the proposal, including suggested section headers. In class, students were provided with a set of resources around team communication and management structures. However, there were limited resources on proposal writing or project management, with only two example proposals being made available to students. There were, in line with the potential variation in topic areas, no specific knowledge resources for the project topics.

In contrast, curriculum documents show that the class sessions were highly structured, with planned activities every week. While students were expected to develop their concepts between classes without detailed instruction, many of the project management tasks were carried out during class. These activities involved a mix of within-team project development and peer evaluation tasks. For example, in the first week, students were required to use the provided resources on team management to negotiate a set of ‘rules of engagement’, including agreed strategies
for dealing with team problems. They were asked to draw the agreed set up in a document and to bring this document to the second session, when it was ‘lodged’ as an agreement. The nature of this agreement was entirely at each team’s discretion. Between classes, they were also to generate a first set of ideas about community needs and potential solutions, either individually or in their teams. Session two commenced with a SWOT analysis of these ideas and presentation to the class group. Students then ranked their ideas based on their own preferences and group feedback, selecting one to be pursued further. A second activity in session two involved an introduction to Gantt chart project management and an exercise in mapping out the first part of the project. In week three, one student from each team was asked to visit another team. The teams then presented their ideas, including the challenges faced, and asked for feedback. This short activity was characterised as an ‘espionage’ activity, serving two purposes: peer review and benchmarking. Each student who had experienced another team’s ideas had to then brief their own team on the strengths and weaknesses of that project, and any questions it raised about their team’s progress.

In the later sessions allocated to this project, there was a mix of individual consultations and development activities, including practice presentations. For example, in week six, student teams gave practice presentations to the group. Each student team was given a criteria sheet and expected to provide at least one feedback comment or question during these presentations. In this session, students were also able to provide a draft of their proposals to me for feedback, if they wished. Four of the teams provided their drafts, while the remaining two teams requested consultations to discuss areas they were finding difficult. My notes for the consultations suggest that during these meetings discussions covered a broad range of issues in relation to the project, including clarification of requirements, feasibility and coherence of proposal concepts, and advice about team management, project planning and costing methods. The details of my approach to these discussions are described in more detail below.

Roles

As with the previous projects described, I set direction and the framework for activities at the beginning of each session. I also gave detailed instructions regarding the content and aims of activities. The overall approach nonetheless was recorded in the notes as tending to be facilitative, with little interference with student work and an
emphasis on questioning styles, with suggestions of possible approaches to problem resolution and general feedback in relation to areas that teams had covered well and where further attention was needed. For example, notes for one consultation in week six showed that the discussion largely involved my advice based on student questions:

‘I ask how they are doing. Students describe current status of project plan and being stuck on how they cost maintenance – should it be included? I respond with questions about whether they have found out if there is current maintenance on equipment and estimate a cost based on that. They have not. I further suggest that they calculate cost over a five-year period or propose sponsorship from local organisations (would need to include plan for that). Students discuss and start making plan to do latter of suggestions (sponsorship plan). I ask whether there are any other issues, concept looks good so far. Students say no. Seem keen to get on with it.’

Following the early direction provided by instructions and activities, students generally carried out project work independently. Students also reported meeting very regularly outside of class time to discuss their project within their teams and with other teams. This appeared to be an accurate representation of their work, as much of the project content was progressed well between classes. Nonetheless, my notes regarding progress, draft documents and final proposals refer to a concern that students were struggling with the written elements of the work. For example, in week five, I noted that I had noticed ‘a lot of problems with understanding how to write the proposal, [students] seem to be avoiding it’, and, ‘too many bullet points and visuals in the proposals generally – not enough writing yet’. In week seven, I also noted my perception that there were ‘clear problems over the past few weeks with confidence about the document. Students not sure how to proceed with writing and need help with tightening arguments’. This was not reflected in the general role of students in class, however. My notes described students as ‘active participants [in the set activities] and project tasks’.

Students were also proactive in requesting clarification and making arguments for particular directions. For example, notes for session four recorded my perception that ‘students aren’t waiting for me. Arrived on time and they’d started work on next stage already’. Notes for peer review activities and presentations also indicated that students were confident contributors. For example, from the practice presentation
session in week six: ‘a lot of probing questions and suggestions from the group in practice presentations today. Most students asked a question and all questions were followed up. Strong emphasis on criteria’. In addition, they were highly engaged with the final presentations. My notes describe students as having formalised the process to a greater degree than I had expected, arriving ‘dressed up, wearing suits, look like they have made a major effort, waiting outside for their time, carrying black folders. They’ve all been in early to get keys to the lecture theatre and set up their presentation power points’. In response to my comment about this, students from one team described it as ‘like the real thing, nerve-wracking but exciting’.

Assessment evidence, criteria and methods

Of all the projects described thus far, C1 had the most explicitly complex assessment system. There were three parts to the assessment: peer assessment, presentation assessment, and proposal assessment. As noted earlier, all assessment took place at the end of the project and was therefore summative. The assessment period for this project commenced with presentations in week eight. All students were required to attend and present in their teams during this session. The peer assessments were carried out in week nine, using a form that covered effort and contribution, value to the team, leadership, and communication. Students were asked to rank team members, including themselves, in this section. There was an additional section with a list of positive personal characteristics (such as: creative, flexible, patient, self-motivated). Students were asked to list three of these under each team member’s name. In addition, students were asked to comment on their own contribution to the team and to the project. The rankings were used to calculate each team member’s grade up to plus or minus 10% of the team grade. Students were also able to challenge this ranking by convening a meeting with the team and the teacher to discuss the rankings. Proposals and workbooks were also submitted in week nine.

The evidence was weighted, with 75% allocated for the proposal documentation and 25% allocated for the presentation. Workbooks and developmental documents were not explicitly graded. Criteria were given in the brief and in assessment forms as a list covering: quality of team contributions (from the peer assessment), completion of the proposal, inclusion of promotional concepts and a strong argument, creativity and innovation of the concept, design and overall quality of the report, professionalism, accurate and feasible budgeting, and consistency of proposal sections. For the proposal, these criteria were captured under weightings in three sections: creativity
(10%), financial feasibility (10%) and report contents (40%). There was no criteria distribution for presentations, although they were allocated 25% of the overall evidence weighting. In the assessment sheets for presentations, there was, however, a list of possible criteria, covering: organisation, timing and flow, tone, engagement, visuals, appearance, and overall professionalism. As the teacher, I carried out initial assessment and a selection of outcomes graded at low, mid and high-level ranges was then moderated across cohorts in a meeting between the teachers for the unit (three academic staff). The Program Coordinator also reviewed the overall grade spread. My notes show general satisfaction with the outcomes, but some concern with the ‘lack of depth in the writing, ideas are good but arguments aren’t as strong as I hoped for’.

**Project case description: C2**

Unit C2 was allocated 40% of the unit grade and ran for five weeks, with three of those weeks allocated to class sessions.

**Project scope**

This project was described in the project brief as an introduction to brand strategy proposals, particularly introducing students to professional activities related to identifying and proposing directions for a client. Students remained in their interdisciplinary teams for this project, as allocated in C1. Also as with C1, the overall aim was to assist students to gain an understanding of the business-related challenges faced by designers and an understanding of the challenges of design practice as a business enterprise. The project brief set out the project task as follows:

‘You will be split into groups of four or five. In your groups you are required to contact a client company who either has an in-house design department or uses external design consultants. In this context a client company is one where their core business is not design. You will be required to interview the person responsible for design or [who] works in the design department. The audit questionnaire is a standard template that needs to be completed during your interview and submitted as part of your assignment. … your group is required to present a case study of the company.’

The project was further described in the project brief as ‘an audit’ of an organisation’s branding stages.
While the project brief did not explicitly describe stages, the criteria and lesson plans suggested three general stages. The first of these was well-defined, and involved the identification of a client company and carrying out a structured interview with a staff member regarding their existing brand strategy. The second and third stages were more loosely defined and overlapped. First, and using the interview data as the basis for an analysis of the brand, students were required to identify brand strengths and weaknesses, and to suggest alternative strategies. Finally, students carried out development of a final report detailing the analysis, findings and suggestions. As with C1, students were required to deliver a presentation of findings, and to submit their final report documents, at the conclusion of the project.

Ethical approval had been granted for the students to carry out the interview using a specified set of questions. This set of questions was supplied to students, as was a data-recording sheet. There were some minor complexities to the project scope. The project required an integration of knowledge regarding brand strategy and findings from the data analysis. Students were also required to make connections between the data and data analysis findings, business strategy, the market, and branding, and to come to conclusions about the current status of a brand. Nonetheless, while connections were to be made between the findings and recommendations, students were working within a limited scope, and the structure of the report was provided as a set of headings that supported the breakdown of information and a straightforward analysis of issues. The required inclusions for the report were a description of the chosen organisation and findings, a SWOT analysis of the existing brand strategy, and recommendations. The audience for the project was defined as the client organisation, and students were expected to orient their reports accordingly.

**Intended learning outcomes**

Students were expected to demonstrate independent development of the report based on the knowledge gained from the interview process. The requirement with regard to the interview was more specifically focused on compliance with the provided guidelines and templates. Capabilities were structured in relation to the project tasks and therefore covered interview and data gathering protocols, investigations, making connections between business and design, devising arguments, presentation of the report and working in interdisciplinary teams effectively. Knowledge acquisition was focused on the gathering of information about the branding strategy of the selected organisation. In particular, in the project brief,
this information was linked to the articulation of a 'critical understanding of how design is used in the company'. In relation to theoretical knowledge, the project brief also suggested a requirement for students to demonstrate knowledge of branding strategy. This was embedded in expectations for students to make arguments regarding whether the client company were 'managing design effectively', and to suggest 'what improvements can be made'. Beyond the requirement for an argument to be presented in the report, there were no requirements to justify outcomes or decisions made during the development process. Procedural knowledge was focused on interview procedures, recording, selecting and making use of information gathered from the client companies, along with team processes, report writing and presentations, which were well represented in the documented criteria for assessment.

**Scaffolding**

While students were expected to work independently to identify and contact a client company, the interview task was highly scaffolded. Students were provided an interview protocol document for client signature, list of questions, and a data-recording sheet. In the subsequent stages of the project, there were far fewer knowledge resources provided. The two lectures given during this period were fairly lateral, focusing on the general skills of time and project management. Only one further lecture during the project related to broad brand management practices in industry. Students were given no resource materials regarding the progression from data to reports, although the project brief listed required sections: a case study of the company, a SWOT analysis, and recommendations. The latter stages of the project were, therefore, relatively unsupported by knowledge resources.

Similarly, there was relatively little structured activity in class sessions. Lesson plans for these sessions showed that the general pattern focused on team consultations and continuing independent work on report development. My notes indicated that consultation discussions took on a similar pattern to those in C1. Students were asked to provide information about progress and raise any issues or difficulties with which they required assistance. For example, in the third session allocated to this project, three separate consultations followed a similar pattern of ‘updates followed by general advice and prompting’. Where students were having difficulty with writing, I also asked them to articulate the answers to these questions verbally, paraphrased student responses, and encouraged them to use these discussions as a means of
starting writing. There was slightly more scaffolding activity in place for presentations, which as with C1, involved a presentation practice session. This was delivered in the week before submission. Also as with C1, all students were asked to act as ‘clients’ for the purpose of giving feedback. To facilitate this process, they were provided with criteria sheets to fill in and submit to the presenting groups. In itself, the provision of criteria sheets formed some scaffolding around the assessment requirements.

**Roles**

As with C1, I set direction and the framework for activities at the beginning of each session. This was very brief and general, as there were few structured activities. Reminders were also provided regarding timelines. Also as with C1, and noted above, consultations tended to be question-oriented rather than explicitly structured for feedback on work. Consultations tended to start with my question ‘*how are you going?*’ followed by discussion around problem sets. For example, students in one consultation reported that they had completed their interview and were compiling the data, but were unsure about ‘*where to start writing*’. I gave advice regarding possible starting points: ‘*you could try drafting a general background paragraph on the company and then pull out the bullet points (from the data) of the things you think are important*’. Followed by questions, such as ‘*what do you think are the issues? what was your interpretation of the answers?*’ I also made suggestions, similarly framed as questions, about how to identify issues: ‘*who are the competitors? are they thinking ahead? have they embedded the brand in the products?*’ I did not, therefore, provide students with absolute direction in either the content of the analysis or the structure of the report other than that provided in resources.

As suggested by the detailed interview resources and relative lack of additional scaffolding or structure, students complied with requirements but did this with a degree of independence and completed project work largely without direction. Nonetheless, the projects did not progress as expected, with some teams appearing to stall at several stages. According to my notes, in week two there were three groups who appeared to have trouble identifying tasks and seemed confused. For example, ‘*group three reported that they had ‘half done what they were supposed to do and expressed that they had no idea what to do next’*. This was not limited to a few groups, but appeared to be consistent across the group. My notes describe a perception that all of the student teams displayed ‘*tentative behaviours*’ and that students appeared to be ‘*dependent on external prompting for decision-making*’. In
week four, one week prior to presentations, I noted my concerns with progress: ‘there isn’t much writing yet, and students don’t seem to have come to grips with the idea of analysing their data – work to date is very patchy’.

Students also appeared to become less active in class interactions than they had been in C2. While there was evidence that they were meeting regularly outside of class time, I noted that ‘proactive behaviour seems to be dropping off, students aren’t going to other groups, or interrupting and talking about their ideas without me’. In week four, I further noted that students were ‘quieter in class today’ and that: ‘students look worried, they’re still active in discussions and asking questions but the energy level has dropped noticeably’.

**Assessment evidence, criteria and methods**

Formal assessment took place at the end of the project and was therefore summative. C2, like C1, had a complex assessment procedure involving peer and self-assessment, along with my assessment of the presentations and reports. The peer and self-assessments were carried out in week 11, the week prior to the presentation and report submission.

For self-assessments, each team was provided with Likert-style questionnaire covering 25 criteria. The criteria largely focused on satisfaction with team management and the project as a whole. For example, ‘we were all clear about the objectives of the project’, ‘each member of the team had equal amounts of work to do’ and ‘we are all pleased with the outcome of the project’. There was also an open text response section for comments regarding learning from the team experience. Specifically, assuming the same team membership, the students were asked to indicate what they would do differently in a subsequent project to achieve better outcomes.

Peer assessment was carried out using a similar pattern to that in C1, but a variation on the format was used. The form for this assessment listed 10 criteria judged on a five point scale: quantity of work, quality of work, communication skills, initiative, efficiency, personal relations, meeting attendance, attitude and enthusiasm, effort, and dependability. A descriptive rubric was drafted for this purpose. For example, for ‘efficiency’, 0 was described as ‘work is invariably late’, while 5 was described as ‘work invariably done ahead of schedule. Can be counted on to make major contributions’. As with C1, peer assessments were used to calculate each team
member’s grade up to plus or minus 10% of the team grade. Students were also able to challenge this ranking by convening a meeting with the team and the teacher to discuss the outcomes.

Evidence was weighted as 10% for the audit data sheets, 65% for the report and 25% for the presentation. Criteria covered the quality of team contributions (from the peer assessment), the completion of the audit (data sheet), completion of the report, consistency of report sections and inclusion of background detail and recommendations, and depth of critique. In notes from the assessment process, emphasis was given to the depth of analysis and the professionalism of the reports and presentations. For the report, these criteria were captured under two weightings: report content (50%) and report design (15%). As with C1, there was no criteria distribution for presentations, although they were allocated 25% of the overall evidence weighting. Criteria in the assessment sheets, however, listed the same range of attributes as for C1: organisation, timing and flow, tone, engagement, visuals, appearance, and overall professionalism. Also as with C1, as the teacher, I carried out initial assessment and a selection of outcomes graded at low, mid and high-level ranges was then moderated across cohorts in a meeting between the teachers for the unit (three academic staff). The Program Coordinator also reviewed the overall grade spread.

My notes for this project case show that although presentations were of a reasonable standard, I felt some dissatisfaction with the content of the projects, and the report outcomes in particular: ‘the reports overall are disappointing. Short but not concise, lots of bullet points but no real analysis and no link between brand strategy and recommendations, superficial arguments, a long way from where they could be at this level, wouldn’t be able to say they were competent in this area, seems more like an exercise than a project’. I also wondered about the causes: ‘some teams have managed to capture a fair amount of data, but it seems to me they didn’t know what they were trying to (or could) do with it – did they have enough time/knowledge?’

Chapter summary

This chapter has presented a descriptive overview of the unit and project cases, based on the tabulation of data within the curriculum model. In summary, Case A1 was a highly complex project involving students in carrying out full design and
specification for a library building, to be developed on an existing site. There were several interlinking tasks and problems. Scaffolding was provided in the form of the project stages and through critiques and presentation activities. Assessment was of the final portfolio of work and also involved a design jury.

Case B1 involved a short, structured set of activities, in which students collated images related to words or expressions. The primary intended learning outcomes were centred on following instruction to practise basic skills, and students appeared to complete this project with ease. Assessment was of the collated image sets and included concern with expressive capacity and aesthetics. Case B2 was a longer project involving several stages, beginning with structured activity and progressing to more independent work in the latter stages. A mix of peer and teacher feedback activities was incorporated into these latter stages. Assessment included a wide range of criteria and, as with B1, also included concepts around communicative power, design quality and aesthetics. Case B3 was shorter and less complex than B2, involving structured short stages of refinement on a relatively simple symbol design task. Scaffolding included copious resources about the principles of symbol design, as well as peer review activities. Assessment was of the final set of symbols, with very similar criteria around communication and aesthetics as found in B2. In all of these cases, students appeared to progress well and be active during class sessions.

Case C1 involved the development of a creative proposal. Students were expected to identify an area of community need and devise a solution proposal. The physical outcomes in this case were both the design of the solution, where appropriate, and a proposal document. Scaffolding in this project followed similar patterns to those in B2, with early structured activities progressing to high levels of independence. The activities in C1 were focused on team processes rather than content proposal. Nonetheless, students appeared to progress well through the project and were active in carrying out tasks and in class. The assessment also reflected a mix of concentration on the team processes, proposal veracity and design quality. The project in C2 was of a smaller scale, involving students in data collection around a brand and the development of brand recommendations. The outcome of this process was expected to be a detailed written report. As the teacher, I took a similar approach to that found in the latter part of C1, providing students with general guidance rather than specific development activities. Students did not appear to progress through this project as well as expected and were notably less active than in C1. The report was
the major focus of the assessment criteria. In both C1 and C2, presentations were also assessed.

The six project cases showed distinct similarities, and variations, in the way that they were organised. These variations and similarities are further elaborated in the later chapters on the analysis of variations and common characteristics of projects. In the next chapter, an analysis of the internal logic of each project case is presented.
Chapter 5:
Analysis of congruence within cases

As noted in Chapter 3, systems approaches assume that systems are dynamic and that variables are interrelated. Each variable has a direct or indirect affect on other variables, affecting how the system as a whole operates over time. Where a system is, at least in part, designed, it is likely also to be directed toward a particular goal. Congruence of the variables in achieving that goal is, therefore, of importance. Congruence can be considered in two ways, the compatibility of variables with one another and their compatibility with the goals of the system. Understanding compatibility between these elements allows meaning to be uncovered, reciprocal support or hindrances to be identified, and purposeful changes to be made to the system (Salomon, 2006). The analysis of a system therefore involves the establishment of congruity or otherwise across the variables and for the system as a whole.

In this chapter, congruence is analysed within each case through a comparison of detailed data from the variables of the project cases. In the first section, the way in which congruence is treated in the literature is presented. This is followed by an explanation of the criteria formulated for this study. Each of the project cases is then analysed using those criteria. The final section of the chapter summarises the common issues of congruence identified across the project cases.

The basis of evaluation

… students [doing projects] would benefit if curriculum developers and teachers were to invest more in the definition of goals and the congruence between stated goals and the activity students are engaged in. (Helle et al., 2006)

It is widely argued that coherence or alignment of the curriculum constitute criteria for ‘good’ curricula. However, judging alignment is challenging (Engineering Subject Centre, 2006; Rust, 2002; Webb, 1997). Webb (1997, p. 5) points out that ‘expectations and assessments frequently are expressed in multiple pieces or documents, making it difficult to assemble a complete picture’. When assembled, the
picture is also a complex one, with goals being achieved in a variety of ways, and potentially involving multiple interlocking learning events, materials, activities and experiences.

In the higher education context, little has been done to identify the variables of the curriculum and the means of evaluation of the alignment of these variables. The most widely cited text remains that by Biggs (1999), *Teaching for quality learning at university*. Biggs argues that ‘a good teaching system aligns teaching method and assessment to the learning activities stated in the objectives, so that all aspects of the system are in accord in supporting appropriate student learning’ (p. 11). In his argument, Biggs highlights the need for designing curriculum that involves the student in their learning, assessing for understanding, and monitoring the emotional environment of the classroom. He further emphasises the need for clarity and consistency across all of the variables of the curriculum, and the impact of this on students’ approaches to the learning. Biggs also provides examples of instances that might work against student learning, such as teacher negativity, inappropriate levels of teacher control, excessive student workloads or limited time for engagement, and teaching or assessment focused on superficial or disconnected facts.

While Biggs’ argument regarding the alignment of learning and teaching components gives a clear rationale for the evaluation of congruence across the variables, and an overview of instances that might work against student learning, it does less to provide a comprehensive framework or mechanism through which evaluation of an entire curriculum might occur. In contrast, in the primary and secondary school context, several frameworks have been used for the evaluation of the coherence or alignment of curricula variables. These frameworks tend to place emphasis on knowledge content, which are measured against standardised tests of student achievement. Porter (2002) uses proportion matrices to identify the amount of particular content covered in a class, measured against the relative proportion in assessment. The Achieve Methodology (Rothman, Slattery, Vranek, & Resnick, 2002) uses four sets of criteria: content centrality, performance centrality, challenge, balance and range. By using performance centrality, the way in which students are expected to demonstrate knowledge application is included. Challenge, balance and range criteria enable more qualitative measures of the level and consistency of knowledge concepts in relation to the levels of expectation. The Surveys of Enacted Curriculum Methodology (Smithson, 2010) uses a similar range of criteria and in addition includes methods of instruction. This is focused on the means by which teachers deliver knowledge.
content rather than the process of instruction, interaction or behaviours between teachers and students.

Webb’s (1997) framework has been widely cited as the most comprehensive of the curriculum alignment evaluation frameworks (Martone & Sireci, 2009; Porter, 2002; Rothman, et al., 2002). It also focuses heavily on knowledge by emphasising knowledge content categories. In the framework, Webb sets out four groups of criteria for the evaluation of alignment:

1. Content focus

Consistency across goals, instruction, learning events and assessment in the type and amount of content. There are several dimensions on which content can be judged:

a. Categorical concurrence – the same or consistent categories of content appear

b. Depth of knowledge consistency – dimensions of cognitive complexity including the application in different contexts, generalisations, connections between ideas

c. Range of knowledge correspondence – span of knowledge within topics and categories

d. Structure of knowledge comparability – the degree to which underlying conceptions are in agreement with those in the standards or goals

e. Balance of representation – comparable emphases on knowledge, ability and context of use

f. Dispositional consonance – expectations of attitudes and beliefs, and skills such as self-direction, self-assessment

2. Articulation across grades and ages

a. Cognitive soundness determined by best research and understanding – up to date conceptions of learning and level of achievement at each stage are consistently applied

b. Cumulative growth in content knowledge – structured and progressive learning over time

3. Equity and fairness

Every student is given a reasonable opportunity to demonstrate attainment, taking into account the full diversity of a student body, including multiple types of assessment instrument

4. Pedagogical implications
Instructional practice allows students opportunities to carry out tasks that fulfil their learning needs, including:

a. Engagement of students and effective classroom practice – the inclusion of opportunities for students to engage in learning opportunities that meet the full range of criteria

Criteria for evaluation of congruence in the curriculum

Webb’s categorisation of criteria provides a thorough foundation for an evaluation of alignment that covers not only content and assessment, but also the way in which students are given opportunities to learn, and the alignment of those opportunities with other aspects of the curriculum. However, Webb’s criteria are designed for primary and secondary school use, where curriculum is largely externally set. As a result, the criteria are heavily focused on measuring the type and amount of knowledge content in relation to standardised assessment. In the project context, a more balanced approach was needed, allowing for equal emphasis on the level of expectation, application of knowledge, interactions between teachers and students, and equity in the opportunities for learning, as well as accommodating the higher degree of autonomy and variation found in the higher education context.

An adaptation of Webb’s criteria for the evaluation of alignment, informed where appropriate by the broader literature and the examples provided by Biggs, was therefore used in this study to evaluate the coherence of each data set. The details of the criteria, the rationale for their adaptation and their use in the analysis of cases are further described below. In summary, the criteria were:

• Articulation – the degree to which the curriculum is appropriate for the cohort and program context

• Categorical concurrence – the consistency of knowledge, capability and quality concepts across the categories and variables, including project tasks, resources, activities and assessment

• Dispositional consonance – approaches to learning and teaching, demonstrations of behaviour in consonance with the project level

• Equity – a variety of opportunities for every student to learn, to achieve and to demonstrate achievement of the intended learning outcomes
Articulation

Webb’s model includes the need for progressive growth in the level of learning experiences. While Biggs does not deal explicitly with the alignment of the curriculum with program levels, it is generally agreed elsewhere in the literature that the scope and degree of student independence in any learning task should be designed with concern for learners’ prior experiences and capacity (Barron, et al., 1998; Kilpatrick, 1918; Print, 1987; Roberts, 2006). In identifying coherence in the articulation aspects of the curriculum, Kilpatrick (1918) further points out the importance of both providing sufficient support for the possibility of success and allowing for sufficient challenge for students to advance their capabilities. That is, that the scope, complexity and scaffolding of a learning task match the learner capacity and provide opportunities for increasing independence (Barron, et al., 1998; Grow, 1991). This includes the need for continuity and growth across a program of study (Print, 1987; Ratcliff, 1996b). At the institutional or program level, Print (1987) describes the notion of sequencing as vertical integration. Vertical integration concerns the sequencing or balancing of curricula over the length of a program. If progressively higher-level learning outcomes are required over a period of study, for instance, the sequencing of curricula over the period enables linking between units so that they can be designed with increasing complexity.

Taking into account the contextual elements of alignment described in the literature, in this study articulation was reviewed with a concern for the known aspects of student prior experience and the program stage in which the project was set. Analysis of articulation rested on the available evidence and was as a consequence restricted to teacher perceptions or expectations regarding student capabilities and prior experiences, and the articulated goals of the learning process in relation to expectations of student capacity at the conclusion of the project. Some additional data regarding entry requirements and the likelihood of students having experienced the full program of studies was available for comparison, and was thus also used to make judgements regarding the nature of students’ prior experiences.

Categorical concurrence

The connections between the goals, events, resources and assessment of learning should be clear and close. Multiple authors have written on the necessity of clarity and consistency in curriculum, and the need for deep consideration to be given to
these concepts during curriculum planning, enactment and evaluation (Biggs, 1999; Martone & Sireci, 2009; Print, 1987; Ratcliff, 1996b). A number of authors, including Biggs, assert that the coherence and quality of curricula are explicitly linked (Biggs, 1999; Cohen, 1987; Ratcliff, 1996a). Biggs (1999, p. 26) argues that:

… the curriculum is staged in the form of clear objectives … teaching methods are chosen that are likely to realize these objectives; you get students to do the things that the objectives nominate. Finally, the assessment tasks address the objectives, so that you can test to see if the students have learned what the objectives state they should be learning.

There is therefore a clear concern with the internal coherence of the curriculum, taking into account the objectives, content, activities and assessment. Webb’s original criterion includes Categorical Concurrence as a subset of content focus, covering the degree to which the same concepts are repeated across all aspects of the knowledge resources, learning activities and assessment. Also in Content Focus, there are criteria for the consistency of breadth of knowledge, depth of knowledge, and a spread of knowledge, activity and context. These criteria appear to repeat a concern with the consistency of representation across the categories but to give greater emphasis to knowledge delivery than to the alignment of objectives, resources, activities and assessment. More logically, the agreement between each of the variables in relation to breadth and depth of knowledge, skills and behaviours can be captured as the concurrence of concepts and actions across categories. In this study, Categorical Concurrence was therefore used as the criterion to capture the overall internal consistency of these aspects of the curriculum.

Dispositional concurrence

Under Content Focus, Webb lists Dispositional Consonance. This criterion is related to the alignment of expectations about student behaviours and attitudes to learning, such as self-direction, with the learning activities and assessment process. Vermunt and Verloop (1999) extend this concern to interactions between students and teachers and, in particular, the congruence between their regulative activities and the requirements of the work. In this thesis, the broader view is taken, broken into two specific concerns.

The first part of this criterion is the concurrence of teacher and student behaviours with the level of responsibility and control explicit in the project framework. In the
Project methods as the framework for undergraduate design education

In the project context, Morgan (1983) argues that project methods can be defined by a continuum of locus of responsibility. That is, the degree to which students and teachers are responsible for managing the work, providing direction and identifying resources. While Biggs breaks learning activities down into teacher-controlled, peer-controlled and self- (student) controlled activities, Vermont and Verloop concur with Morgan’s analysis of control as being a continuum of behaviour that can be identified across both behaviours and the learning activities. They also argue that teachers take on roles related to levels of control ranging from strong teacher control through shared control of learning. This is the explicit degree of control and responsibility in relation to the structure of the work to be carried out by students.

The second and related concern is the disposition of students and teachers to each other. Biggs (1999) argues that behaviours in the classroom have a strong influence on student learning. His argument is focused on teacher behaviours. Specifically, he notes the relationship between teacher negativity and the de-motivation of students. Grow (1991) also argues that student and teacher dispositions influence each other. Vermunt and Verloop (1999) concur with Grow’s perspective, arguing that student and teacher roles are intertwined and that teachers shift roles according to perceptions of student capabilities. They describe three types of outcome dependent upon the relationship between student and teacher roles. The first of these is congruence – in which student and teacher regulative behaviours are aligned with each other and with the learning task. Second is constructive friction – in which students are required to extend their self-regulation behaviours by a lower degree of teacher regulation, but these are within their reach. The third is destructive friction – in which students are either unable to self-regulate to the degree required by a lack of teacher regulation, or where the teacher over-regulates activity, causing students to comprehend the learning requirements as compliance-oriented. Destructive friction reinforces student dependence and can cause reversals or deterioration in student learning (Clark, 1990; Entwistle, 1992; Vermunt & Verloop, 1999). In the analysis of congruence, therefore, a second layer of analysis was related to the concurrence between teacher and student behaviours and interactions.

**Equity**

In Webb’s criteria, equity is concerned primarily with the range of assessment opportunities offered to students, and the capacity of assessment methods to capture learning for the full diversity of the student cohort. Webb (1997, p. 25) argues that:
When expectations are that all students can learn to high standards, aligned assessments must give every student a reasonable opportunity to demonstrate attainment of what is expected. Expectations and assessments that are aligned will serve the full diversity in the education system through demanding equally high learning standards for all students while fairly providing means for students to demonstrate the expected level of learning.

Webb indicates that the opportunities to learn are also important, arguing that 'the structure of the curriculum may keep [students] from attaining sufficient experiences to learn what is expected' (p. 26). In any context, and for any aims, there is generally a range of possible teaching methods and learning activities that would support the achievement of the learning objectives. Numerous authors advocate variety in teaching approaches and learning activities as the most effective means of ensuring that learner needs are met, and that the most effective means of achieving objectives are chosen (Becker & Watts, 1996; Biggs, 1999; Print, 1987; Vaughn & Baker, 2001).

Biggs (1999, p. 152) concurs with both of these points, and states the importance of ensuring that students have opportunities to demonstrate ‘total performance – not just aspects of it’. Print (1987) also advocates the use of multiple instruments in order to gather valid and comprehensive data on learner achievement. The effects of these instruments and assessment processes can be broader than providing data on learner achievement. It is well established that learners identify and are often motivated by the assessment instruments and processes, and what they imply is important to the teacher (Biggs, 1999; Boud & Falchikov, 2006; Jarvis, et al., 2003; Rowntree, 1987).

These arguments support Webb’s inclusion of equity as an important dimension of establishing the degree of congruence in any instance. That is, in order to meet the variety of knowledge, capabilities and qualities set out in the intended learning outcomes, students are able to learn in a variety of ways and have opportunities to demonstrate their strengths through multiple assessment instruments and criteria. Evaluation of equity was therefore based on two related concepts: multiple types of learning activity available to students through the curriculum structure and project tasks; and opportunities in assessment for students to demonstrate learning in different domains.
These concepts were used because of their capacity to capture the overall consistency of the curriculum in relation to the emphasis on knowledge, capabilities and qualities, and the opportunities for learning and demonstration of that learning.

**Evaluation of congruence in the cases**

Instances of dissonance were identified through two triggers during analysis: an expression of frustration by teachers or students, and inconsistencies in data across the variables.

**Case A1**

During observations, the teacher noted that students were not making sufficient progress between classes, and appeared to be waiting to be told what to do. At the conclusion of the unit, during the interview, the teacher also commented that the learning outcomes, based on the quality of products submitted for assessment, were not at the level expected. The overall quality of the designs, depth of consideration and justifications were identified as particular concerns. As noted in the previous chapter, the teacher indicated that this was not a strong group of students, with only two students reaching the desired level of achievement in their product outcomes.

**Articulation**

The key characteristics of students in relation to articulation can be summarised as:

- Third year undergraduate interior design students, near end of degree
- Most entered in first year and completed first and second year units of study

This meant that the teacher was likely to have a reasonable understanding of the level of students’ prior experience, and that students could be expected to be experienced in carrying out design projects of a similar nature. The teacher argued that as final year projects, an important aspect of the project was as a transitional experience, preparing students for their first year of professional employment in design. The teacher held a resulting expectation that the project should be sufficiently challenging to engage the student at a professional level. The time allocation and scope of the project reflected this expectation, namely:
• The time allowed for the project was the greatest of those studied, i.e. 14 weeks development time

• The project was allocated twice the credit of any other project and had twice the contact hours each week

• It was a highly complex project, with major challenges and several products

• It involved application of a broad range of knowledge and skills

Students were completing only two other units of study simultaneously, while the other projects studied were carried out simultaneously with another three units of study. This meant that students could dedicate half of their workload to this project. This accorded with the significance of the scope of the project. Also in accordance with the purpose of the project as a transition to a professional context and the complexity of the work, the students were expected to:

• Work independently, demonstrate self-regulation, select and utilise learning resources as appropriate

• Define their own project direction, manage time, identify problems and return to tasks as necessary

• Demonstrate mastery of the field, individual artistry and sophistication and justify their decisions to a professional audience

This meant that students were expected to have high levels of existing capability and to be sufficiently confident to complete the work without structured support. The process was supported by minimal scaffolding and focused on individual progression through the project stages, namely:

• An initial site visit, a light study and some general definition of project considerations, tasks and products

• Ongoing individual critiques supplemented by practice presentations and pin up review sessions

In addition, the requirement to present to a panel of professional architects reinforced the teacher’s expectation of a high level of outcomes and the teacher’s indication that the project was intended to be authentic to the scope of professional work.
These elements of the curriculum appeared well aligned with the level of the student cohort and program, and with the expectation that students were transitioning to professional practice. The teacher also reported that the level of complexity of this project was similar to that in other units at this level. This belief also accorded with the data from the more general review of unit outlines across the faculty programs. While student outcomes were not at the expected level, in a system all variables are interrelated and have both direct and indirect influences on the outcomes. This means that in any case, the articulation may be well aligned but students may still not be able to carry out the project effectively. As will be seen later in this chapter, there were other aspects of the curriculum that were implicated in the lower than expected outcomes.

Categorical concurrence

The data showed coherence in the representation of some knowledge, capabilities and qualities across the variables. Specifically, these can be summarised as repeated focus on:

- Investigation of a complex problem situation and associated complex problem-solving tasks
- Iterative development and sophisticated refinement of solutions
- Aesthetically well-developed outcomes and clear visual presentation of those outcomes
- Independence, self-regulation and self-direction

Conversely, there were some areas where emphasis was not constant across categories. For example, while there was a strong emphasis on theoretical knowledge in the intended learning outcomes, this did not reappear explicitly in discussions or in assessment. There are two possible explanations for this. First, students were expected to gather their own resources and knowledge according to their project direction. This means that students were potentially able to draw on any number of knowledge domains, making it difficult for the teacher to discuss the knowledge base appropriate to each project. Secondly, that although theoretical knowledge was explicit in the intended learning outcomes, this knowledge was treated as previously held or tacit knowledge not requiring further verbal or written...
elaboration. That is, it was not expected that teachers or students would explicitly articulate particular bodies of theoretical knowledge, but that it would be embodied in the product outcomes.

The second instance of dissonance was related to the emphasis on creativity and aesthetics. While aesthetic qualities were mentioned in the intended learning outcomes, and exemplars shown during the first session, interpretations of aesthetics and creativity were not further elaborated. The teacher made critical comments related to the creative and aesthetic qualities of work in progress. The basis of the critique was not explained. As with theoretical knowledge, there are two possible reasons for this. First, that the subjective nature of aesthetics and the degree of ownership of personal styles in design outcomes means that these qualities can only be negotiated in terms of individual student work, and are difficult to express other than in perceptual terms. Secondly, that the teacher expected these qualities to have been developed in earlier experiences and well understood by students, and as a consequence considered them to be subject only to refinement through the project process.

A third instance of dissonance related to the criteria around quality of verbal and visual presentations. The ability to present visual work well was noted in the intended learning outcomes. There were also several presentation activities present in the latter half of the semester, which the teacher reported were intended to provide practice in presenting work for feedback. During presentations in class sessions, the teacher commented that students had not achieved sufficient competency in either their visual or verbal presentation skills. The criteria for achievement of quality in presentations were not elaborated. There were no knowledge resources for this aspect of the project, and details were not provided in the project brief or assessment documents. There are several possible explanations for this. As with theoretical knowledge and aesthetics, it is possible that this capability was either assumed as pre-existing or tacit and embedded in other aspects of the project. Nevertheless, the fact that students had not achieved the required level of quality indicated that students had neither the experience nor sufficient information about requirements to achieve the quality required.
Dispositional consonance

As indicated in the early part of this chapter, dispositional consonance involves two related concepts: the locus of control in relation to the project, and the interaction style during class sessions. The locus of control in relation to the project operates on a continuum from high teacher control to high student control (Grow, 1991; Morgan, 1983; Vermunt & Verloop, 1999). This is evident in explicit project features that locate control through responsibility for activity, and the degree to which students and teachers take up this responsibility. This project was structured to involve:

- A high level of student control over project direction and decision-making resulting in Individualised outcomes
- Independent gathering of resources to support project development
- Defense of the decision-making processes and outcomes

In line with the suggestion that students had a high level of control over, and responsibility for, their work, the teacher focused on:

- Individualised critique on progress
- Low levels of structured scaffolding

The teacher in this case, therefore, took limited responsibility for the project activity. This aligned well with the explicit level of student control. Students also:

- Completed project work largely outside of class sessions
- Generally made decisions about project direction

While the explicit levels of control appeared to align well, some problems were identified with student behaviours in relation to carrying out work independently. In particular, the teacher reported frustration with the lack of progress between class sessions. In consultation sessions, a great deal of the critique was also centred on the failure of students to have located necessary resources. This indicated that although the teacher’s role in relation to the project was consistent with the locus of control, students’ roles were not.
The second area of dispositional consonance is the interaction between teachers and students during contact. This area yields some clues as to reasons for the lack of student responsibility and progress. The teachers approach to interaction involved:

- High levels of direction and critique in individual and whole-of-class discussions
- High levels of control of classroom activities, including changes to scheduled student-focused activities

In accord with this approach to control during class sessions, students:

- Tended to wait for the teacher before committing to decisions
- Did not contribute voluntarily to any discussions
- Were generally passive

This data showed that the teacher took a more directive role, and students a rather more passive role, than might be expected in a project where the locus of control and responsibility rested with the students. This indicates that destructive friction, as described by Vermunt and Verloop (1999) was present in this case.

There are two possible reasons that might be advanced for the misalignment of the interaction styles. First, that the teacher took on a directive role and that this affected student confidence in carrying out independent decision-making or expressing views. Secondly, that students took on a passive role and that their reticent behaviour influenced an adaptation of the teacher’s behaviour to a more directive role. In either case, the roles indicated in A1 were not consistently aligned with the project type or with each other over time, and this appeared to have a negative impact on both the student and teacher experience. These findings further suggest that the interaction style is as important as the explicit project structure to the locus of control or responsibility being effectively enacted.

Equity

Equity requires similar opportunities to learn, and to demonstrate learning, for every student. In addition, equity includes the potential for students to demonstrate learning in a range of ways, in particular reference to a breadth of styles, strengths and weaknesses. In this case, equitable aspects of the project can be summarised as:
• Same project brief for every student, with scope for individualisation

• Opportunities for all students to investigate, gather resources, and tailor choices to their preferences/strengths

• Flexible timeframes for each stage and activity, allowing students to spend longer on more difficult tasks and return to them if necessary

• A wide range of activities including investigations, problem-solving, production of physical products, specifications

• Presentation of a range of assessment evidence, including developmental work and several project components demonstrating a variety of skills and knowledge

• Use of assessment criteria covering a range of domains and sufficient flexibility in criteria to allow for grading against relative strengths and weaknesses

The data suggests that this project was highly equitable in relation to Webb’s criteria. Nonetheless, in this case two areas of dissonance relating to equity were noted. The first of these related to opportunities to practise skills and opportunities for feedback during class. Although presentation opportunities and individual consultations were scheduled to include all students, these were often curtailed through either time constraints or as a result of the teacher making alterations to the schedule. In particular, presentations in one session were stopped after two students had presented. This meant that four students did not present during semester. In addition, while all students received feedback during individual consultations on a fairly regular basis, there was a tendency to carry out those consultations in the same order each session. This meant that some students received less feedback than others as time was reduced toward the close of a session.

The second area of dissonance related to variations in emphasis in the criteria for achievement. As previously noted, although the written criteria were inclusive of the intended learning outcomes and range of products in the project, the teacher articulated a strong emphasis on creative and aesthetic qualities in the final project outcomes. During sessions and during the assessment process, two students were singled out as achieving the intended learning outcomes. In both cases, these students had achieved general compliance with the technical aspects of the project and had presented sufficient developmental work. Despite this, technical reports and
developmental work were not reviewed in any detail, and emphasis was placed on the aesthetic quality of their final products. This indicated that students who had achieved highly resolved aesthetic outcomes were graded more highly than those who had achieved well in the learning process, technical reports or knowledge aspects of the project.

Case B1

There were no indications from students or the teacher that they perceived there to be problems with the project. The teacher reported that the project portfolios were of an expected standard, and that students had performed well throughout.

Articulation

The key characteristics of students in relation to articulation can be summarised as:

- All were first year undergraduate graphic design students and had completed one semester of study
- All had completed an introductory unit in visual communication (with the same teacher)

This meant that the teacher was likely to have a reasonable understanding of the level of students’ prior experience, and that students could be expected to have some basic experience in the program, but would not be expected to be accomplished in carrying out design processes. The time allocation and scope of the project reflected this expectation, namely:

- There were 2-3 weeks for development and submission of the project
- This was a small group project made up of short directed steps, with no distinct parts or complex problems
- The project involved the application of basic skills within templates, and a focus on basic self expression
This narrow scope accorded with the level of the student cohort and level of the program. Also in accordance with the narrow scope of the work, the students were expected to:

- Follow instruction in class and comply with detailed task requirements
- Locate simple, widely available, visual resources and edit in a group

This meant that students were not expected to have high levels of existing capability. Rather, they were to practise basic skills with minimal self-direction or independence required. In line with this expectation, the project was highly scaffolded, including:

- Short and highly delimited stages with step-by-step instruction for each task
- All but minor tasks carried out during in-class group-based activities
- Provision of detailed and comprehensive templates, guides and knowledge resources

The project was designed as an introduction to basic skills that could be completed by students with no prior experience other than basic software skills. These skills were introduced in the previous unit, giving the teacher a reasonable understanding of the capacity of students to complete the work. Generally the scope of this project appeared to be aligned with the teacher perceptions of the level of the cohort.

*Categorical concurrence*

The data showed a general coherence in the representation of the topics, depth and breadth of emphases on knowledge, capabilities and qualities across the variables. Specifically, these can be summarised as repeated focus on:

- Basic skills, personal expression and clarity
- General principles for visual and verbal expression
- Templates and detailed instruction to enable compliance

All of the learning outcomes were met by scaffolding in B1. The initial mapping activities emphasised conceptual abilities, while sourcing materials and editing of visual work focused on basic investigative, exploratory and evaluative skills. The
selection of materials included both visual communication and personal expression. Putting work into templates exercised basic technical skills and aided compliance.

Only one area of concern was noted in categorical concurrence. Although the criteria for assessment included stylistic quality and insight, these concepts were not explicitly embedded in activities nor were they explicit in the intended learning outcomes. Nonetheless, during assessment the teacher appeared to focus exclusively on the intended learning outcomes, and although the teacher provided feedback to students regarding the stylistic quality and insight demonstrated in outcomes, did not appear to place emphasis on them in the application of grades. These, therefore, appeared to be additional criteria for comment only, albeit not clearly differentiated as being of less importance than those criteria relating to the intended learning outcomes.

Dispositional consonance

This project was structured to involve:

- A high level of teacher control over project progression
- Step by step instruction applied to short, structured, activities
- Minimal student independence or decision-making

In line with the suggestion that students had a low level of control over their work, the teacher:

- Provided a framework and detailed instruction for all activities
- Provided constant information, reminders and reiterations
- Spoke from the centre of the class to the entire group, and checked progress with each group

This suggests that the teacher took a high level of control during class, which was aligned with the project scope and level. Equally, students carried out work as directed and during class sessions demonstrated:

- A capacity to listen and respond to information and instruction provided by the teacher
• General compliance with the patterns of activity

Both the teacher and student level of control and interaction styles appeared to be consistent with the explicit locus of control in the project structure resting with the teacher. This was a different picture of control than that found in the data regarding student interactions in class. Specifically, students also:

• Interrupted to seek clarification and approached the teacher during activities

• Carried out spontaneous discussions with peers, including students from other groups

The data demonstrated a high level of confidence enabling students to engage actively in class discussions, and a consistent balance of compliant and active behaviours. While it is possible that this was a particularly confident group, there are also three possible explanations for this behaviour in relation to the curriculum that have wider implications. First, that the alignment of the locus of control and interaction styles promotes confident behaviour. Secondly, that the teacher’s style of interaction afforded student confidence and encouraged active engagement. Thirdly, that the group work encouraged high levels of student interaction and confidence. In comparison with A1, any one of these aspects of the project could be implicated, as none were present in that case. From a systems perspective, the most likely conclusion is that all three explanations interact to create a positive experience in relation to dispositional consonance.

Equity

In this case, as with all of the projects, the assessment was of the products of the project. Equitable aspects of the overall project structure can be summarised as:

• The same project brief and tasks provided to every student

• A series of interrelated activities requiring some variation in skills

• Assessment evidence the same for every student, including developmental work and final outcomes

• Sufficient flexibility in criteria for grading to a balance of strengths and weaknesses
Consonant with the low risk and small-scale nature of the project, there was a smaller range of activities and assessment evidence available to students compared with A1. Within those limits, there was sufficient equity for each student to learn and demonstrate their learning. There was also evidence of equity in learning opportunities in relation to the group activities and discursive learning experiences, including:

- A balance of group and individual work
- A balance of whole of group and individual instruction and feedback
- Multiple opportunities for peer discussion and encouragement for students to engage with one another and share information, problems and progress

This meant that students had a range of opportunities to engage with the learning process and were able to engage both as individuals and as a group. Further, they appeared to make consistent use of these opportunities.

Only one area of dissonance was noted. This was related to the relationship of the assessment process to individualised learning outcomes. In the intended learning outcomes, students were expected to achieve a degree of exploration and self-expression. There were also stage activities that involved individual work. Although students submitted workbooks demonstrated that they had achieved these aspects of the project, these were not graded. The final application of grades was for group outcomes only. Thus while students had the opportunity to demonstrate their individual contributions to the project, these could not be acknowledged using a solely group focused assessment.

**Case B2**

As with B1, the teacher reported that the project portfolios were of an expected standard, and that students had performed well throughout the project process. There was also no explicit indication from students that they felt there were problems with the project. However, some minor issues were noted by the teacher, and these are discussed below as appropriate.
Articulation

The key characteristics of students in relation to articulation were similar to those found in B1, and can be summarised as:

- All were first year undergraduate graphic design students and had completed one semester of study
- All had completed an introductory unit in visual communication (with the same teacher)
- All would have completed project case B1

This meant that the teacher was likely to have a good understanding of the level of students’ prior experience, and that students could be expected to have some basic experience in design problem-solving. This was a larger scale project than B1 and was allocated 5-7 weeks development time. The project scope reflected the expected level of the student cohort and the longer timeframe, namely:

- The project was designed around a simple problem situation
- It involved well defined stages with thematic links between similar parts
- There was limited decision-making required, supported by step-by-step instruction and widening to solution of visual and material problems in the latter stages

Reflecting this expectation, students were expected to:

- Follow instruction in class and comply with requirements
- Carry out some general independent investigation, including locating visual/material resources
- Demonstrate increasing levels of self-direction and self-evaluation over the period of development

Students were not expected to have high levels of existing capability, but to develop their skills as the project progressed. The early structure of the project reflected the level of expectation, namely:
• Highly structured, well-defined, activities to complete the early project stages

• High levels of scaffolding provided including templates and copious knowledge resources

The early high levels of scaffolding gave way to more independence and fewer controls in the latter part of the project. Specifically, there was a reduction in the level of set activities that were directly related to completion of project tasks. These were replaced with:

• Individual consultations

• Peer review activities

• Between class progression of project tasks

The increase in independence in the latter part of the project meant that students were expected to employ a higher degree of self-direction and self-regulation as the project progressed. This was aligned with the expectation that students would commence the project with low levels of capability but would advance their capacity for decision-making as the project neared completion. Nevertheless, some students appeared to find this transition difficult, and the teacher noted that there was inconsistent progress in the fourth and fifth weeks. As a result, reminders and reiterations of the steps to be carried out, as well as the aims and emphasis of each, and further examples, were provided on a regular basis in the following weeks. In the interview, the teacher reported that progress appeared to improve in the final weeks of the project, with all students achieving the required outcomes. As in B1, but with a minor adjustment to scaffolding by the teacher as a result of a perceived student need, this project therefore appeared to be generally aligned with the level of the cohort and program.

Categorical concurrence

The data showed a general coherence in the representation of the topics, depth and breadth of emphases on knowledge, capabilities and qualities across the variables. Specifically, these can be summarised as a repeated focus on:

• Information gathering as the basis for visual and material design
• Aesthetic and technical design quality

• Compliance with steps, templates and content inclusion requirements

• General connections between situational and procedural knowledge

Lectures focused on general concepts around connecting visual expression and managing constraints, while classes were focused on the information gathering and organisation of information aspects of the project. For the aspects of the project requiring compliance, detailed knowledge resources, templates and instruction were provided. There was also a consistent spread of emphasis across the intended learning outcomes in both teacher and peer feedback sessions. Assessment criteria similarly covered compliance with templates and submission requirements, completion of stages, evidence of gathering information, refinement to designs in response to feedback and emerging challenges, and gave equal emphasis to the technical, conceptual and aesthetic aspects of the project. Across all categories a balance of representation was therefore found in the type, breadth and depth of knowledge, the procedural skill requirements, the behaviours expected of students and qualities desired in the products.

Dispositional consonance

The project was structured to involve:

• Early high levels of teacher control demonstrated through short structured activities and stages

• Some student decision making and problem-solving in the latter part of the project relating to visual and conceptual direction and some choice of materials

In line with the high level of explicit control in the early part of the project, the teacher demonstrated a high level of control of tasks. Specifically, the teacher:

• Provided a framework and detailed instruction for all activities

• Provided constant information, reminders and reiterations

• Spoke from the centre of the class to the entire class and checked progress with class and individuals
In the latter part of the project, where the control explicitly shifted to being shared with students, the teacher provided:

- Activity frameworks (longer stages), general instruction, examples and reminders
- Individual consultations, questions, suggestions and feedback

The teacher’s role was demonstrably matched with the progressive ‘letting go’ of decision-making explicit in the project outline. In particular, the teacher displayed less control over the visual content of the projects than over the technical compliance aspects of the projects. Equally, in the early part of the project, students carried out work as directed and during class sessions demonstrated similar behaviours as those found in B1, namely:

- Capacity to listen and respond to information and instruction provided by the teacher
- A general compliance with patterns of activity

In the latter parts of the project, students also matched teacher behaviour, taking more control but still demonstrating some reliance on instruction. In summary, students:

- Made design decisions and progressed their work within stages without direct instruction
- Awaited instructions about new stages before moving on
- Asked for feedback on progress and responded to suggested changes

Thus the level of explicit project control and the associated behaviours appeared consonant with one another. Although the teacher dominated discussion during individual consultations, this was not to the degree found in A1, and generally the discussion appeared balanced. In this case, as in B1, there also appeared to be a high level of confidence enabling students to engage actively in class discussions, and a balance of passive and active behaviours. In this case, there was no group work, but there were several peer activities and encouragement for students to participate. As with B1, the combination of the dispositional consonance and types of activities appeared to promote a positive student and teacher experience.
**Equity**

As with all of the projects reviewed, assessment evidence was constituted of the products of the project and criteria related to the overall level of the work. Equitable aspects of the project included those found in B1 with additional components related to the larger project scope. Equity in this project can therefore be summarised as:

- Every student provided with the same project brief and tasks
- All students having opportunities to engage in activities requiring varying skills, including investigation, planning, visual development, problem-solving and manipulation of materials
- Some stage flexibility allowing students to return to work where necessary
- Assessment evidence the same for every student, including developmental work and final outcomes
- Sufficient flexibility in criteria for grading to a balance of strengths and weaknesses

In summary, the data showed that students had multiple opportunities to achieve the learning outcomes and to demonstrate their learning, with potential for demonstration of conceptual, expressive, organisational and visual design skills. In addition, there were formal and informal discursive and peer learning opportunities, specifically:

- Scaffolding designed to include peer feedback activities and a peer support mechanism
- Encouragement for students to engage in discussion, questions and sharing views with the class group and the teacher

Although there was no group work variable to this project, there appeared to be consistent opportunities, taken up by students, to engage in discursive learning and to check progress. There appeared to be no particular issues with equity in this case.
Case B3

As with B1 and B2, the teacher reported that the project portfolios were of an expected standard, and that students had performed well. There was also no explicit indication from students that they felt there were problems with the project.

Articulation

This project, carried out in the same unit as B1 and B2, shared a number of articulation features with those projects. The key characteristics of students in relation to articulation can therefore be summarised as:

- All were first year undergraduate graphic design students who had completed one semester of study
- All had completed introductory unit in visual communication (with the same teacher)
- All would have completed project case B1 and concurrently be working on B2

This meant that the teacher was likely to have a good understanding of the level of students’ prior experience, and that students could be expected to have some basic experience in design problem-solving and in particular, of gathering resources to inform visual development and carrying out iterations of refinement. The project scope reflected a relatively low level expectation of student capabilities. In particular, the project was structured to involve:

- A simple problem situation with short well defined stages
- A single outcome in variation involving only some minor production/visual complexities
- Limited decision-making structured around the iterative refinement of design solutions

Students were accordingly expected to:

- Follow instruction in class, comply with requirements in templates and work within design rules
• Use given knowledge resources and locate own visual resources

• Demonstrate iterative refinement and incorporation of feedback based on teacher, self and peer evaluation and feedback

The scope of the project reflected the project level and expectations that students would have some capabilities in selecting visual resources, but not yet be able to independently seek out appropriate knowledge resources or define direction in an open problem situation. They were also expected to require a high level of guidance. Scaffolding for the project included:

• Copious knowledge resources, lectures and instruction

• Set activities for concept development and peer review

Although undertaken at the same time as B2, this project appeared to be set at an appropriate level to advance from B1. That is, it was well-defined and structured to allow students scope to explore a single set of design challenges. This project appeared to be appropriate to the perceived level of student capability.

*Categorical concurrence*

The data showed a general coherence in the representation of the topics, depth and breadth of emphases on knowledge, capabilities and qualities across the variables. The content of those emphases was similar to that found in B2. Specifically, these can be summarised as a repeated focus on:

• Visual and production problem-solving

• Aesthetic and technical design quality

• Compliance with templates and content requirements

• Iterative development incorporating feedback

As with B2, lectures focused on general concepts around visual expression and managing constraints, while the set activities for concept generation and peer review matched the visual problem-solving and self-evaluation aspects of the intended learning outcomes. As with B1 and B2, detailed knowledge resources, templates and instruction were provided for all aspects of the project. There was also a consistent
spread of emphasis on all the requirements in both teacher and peer feedback sessions. Assessment criteria were part of the scaffolding and were provided to students during peer review activities, providing opportunities for deeper engagement with the underlying concepts. Criteria also showed an even representation of the procedural, technical, conceptual and aesthetic aspects of the project. No instances of dissonance were therefore noted for categorical concurrence in this project.

Disposition consonance

The project was structured to involve:

• High levels of teacher control of project process/problems with short well-defined stages

• Some student decision making and problem-solving in the visual refinement aspects of the project

• High levels of peer and group discussion/feedback activity

In this project, as in B2, the teacher took a high level of control and direction during class sessions, in relation to the project process and production issues. A lower level of control was shown in the content of the projects, specifically the visual direction taken. There was also space provided for students to actively engage in the process. Specifically, the teacher:

• Provided a framework and detailed instruction for all in and between class activities

• Provided constant information, reminders and reiterations regarding compliance aspects of projects

• Spoke from the centre of the class to the entire class, and checked progress with class and individuals

• Facilitated peer and group discussions

The data showed that the teacher’s role was well-matched with the level of explicit control in the project, in particular being balanced between high levels of control over
the framework for projects, with lower levels of dominance or control over the project content and student interaction. In summary, students:

• Demonstrated a capacity to listen and respond to information and instruction provided by the teacher

• Made design decisions and progressed their work within stages without direct instruction

• Actively engaged in discussions, presentations and activities

The project itself was highly structured with short, well-defined stages, suggesting that students were already working within tight parameters. As in B1 and B2, there also appeared to be a high level of confidence enabling students to engage actively in class discussions, and a balance of passive and active behaviours. The data demonstrate that the project structure and the teacher role were well balanced with the student need for scaffolding and support, and that students responded with a degree of self-regulation appropriate to the project level and intended learning outcomes.

Equity

Again, assessment evidence was constituted of the products of the project and criteria related to the overall level of the work. They were also provided with multiple activities and types of learning opportunity. Equitable aspects of the project, many of them similar to those found in earlier cases, can be summarised as:

• The same project brief and tasks provided to every student

• A series of interrelated activities requiring some variation in skills including investigation, visual development, problem-solving and refinement for production

• Some flexibility of stages for students to return to tasks if necessary

• Assessment evidence the same for every student, including developmental work and final outcomes
• Sufficient flexibility in criteria for grading to a balance of strengths and weaknesses

Students had multiple opportunities to achieve the learning outcomes and to demonstrate their learning, with potential for demonstration of conceptual, visual and technical design skills. In this project, there was a strong emphasis on peer and self-evaluation. In the three class sessions dedicated to the project, two were structured around peer feedback and discussion regarding project progress, stumbling blocks and criteria. Although not explicitly present in the products, the use of judgement and responses to peer feedback were present in criteria and the workbook evidence. As with B2, no deficits in relation to equity were identified in B3.

Case C1

The notes taken for this project indicated that students had experienced some difficulties with the proposal development. At the conclusion of the unit, I also noted that the learning outcomes in relation to the quality of the proposal writing, and in particular, the structure and depth of argument, were not as high as expected.

Articulation

The key characteristics of students in relation to articulation can be summarised as:

• All were third year undergraduate students, nearing the end of their degrees in a variety of design discipline areas

• Given the nature of the faculty programs, they were likely to have extensive experience in team based/independent design projects

• They were unlikely to have experience in business/interdisciplinary/written outcome projects

The multi-disciplinary nature of the student cohort meant that there was some difficulty in ascertaining the level of prior experience in knowledge domains. The project could be structured working from the assumption that the students were likely to have some experience of project management, conceptualising design proposals and working in teams, but not in written aspects of the work. Given that they were also in their final year of undergraduate study, they were expected to be developing
professional work skills including time management and self-regulation. The time allocation and scope of the project reflected this expectation, namely:

- Time allowed for the project was the second greatest of those studied, with 9 weeks development time
- There were multiple interrelated parts involving some complexity/tensions in the problem situation
- The project required in-depth investigation of the problem situation, application of procedural knowledge and structured thinking and writing skills

Students were also expected to:

- Work independently, demonstrating a high degree of self-regulation and self-evaluation
- Negotiate and define their project direction within multi-disciplinary groups
- Demonstrate capacity to manage time, project tasks, and task delegation within a group
- Defend outcomes by demonstrating their knowledge of the problem and the structured planning for, and feasibility of, solutions

This meant that the overall project scope was aligned with the level of expectation regarding students’ prior experience and capabilities, particularly in respect to the project process. With the exception of the writing skills and working in interdisciplinary teams, the students were likely to have some experience of each of these processes. Some aspects of the project were also scaffolded in the early stages during class sessions and in lectures, including:

- Information on building arguments, budget management, project and team management
- Set activities advancing team/project management, concept development and presentations
- Individual consultations, peer feedback and open discussions in class
Students were able to accurately judge their progress against their own expectations, the criteria, and the progress of the other teams. The team and project management aspects of the project appeared to be well aligned with the project needs and the cohort level and capabilities. The overall project scope also appeared consonant with the expectations for the level of student capability and the level of the program. These findings were reaffirmed by the good overall progression of the projects. Work was completed outside of class sessions to the agreed stage timeframes and students were largely able to manage negotiation and completion of tasks within the team frameworks they had devised without further teacher assistance or intervention.

In contrast to the good overall project progress, students appeared to be tentative about the report writing aspects of the project, with two teams expressing a great deal of uncertainty about how to proceed with the written aspects of the work. While the teams all managed to provide reasonable budget projections, the written aspects of the report were generally not at the level desired. The proposal drafts that were supplied at the interim feedback point were lacking in coherence and argument, with three groups relying very heavily on bullet points and visuals to make their argument. This suggested more detailed coaching was needed. There are two possible explanations for this. The first of these relates explicitly to the articulation. Given the assumptions about the level of prior experience of students, the expectation that students could independently complete a written outcome may have been higher than reasonable. A related possibility is that additional scaffolding for those aspects of the project was needed. Supporting this, further dissonance related to the quality of writing was found in categorical concurrence. Given the interaction between variables, it is likely that both explanations are valid, and that a combination of refined expectations and increased scaffolding, would have resolved the problem.

**Categorical concurrence**

The data showed a general coherence in the representation of topics, depth and breadth of emphases on knowledge, capabilities and qualities across the variables. Specifically, these can be summarised as a repeated focus on:

- Investigation involving the gathering of situational and procedural knowledge
- Refinement, testing and justification of work in relation to evidence and accurate calculations of costs and benefits
• Project and team management skills, including planning, negotiation and completion of tasks, self and peer evaluation

• Public review of progress and outcomes

The requirement that students engage with business issues in relation to design proposals was clearly embedded in the project tasks and products. These aspects of the project were well supported by both the resources and the activities, and were present in the assessment process. Similarly, the requirement for investigative and argument building activities culminating in a complete proposal were well supported by activities, lecture material and the project stages.

Three areas of dissonance for categorical concurrence were noted in this case. First, reiterating the difficulty noted in articulation, there was inconsistent representation of the written aspects of the project. Students were required to produce persuasive textual arguments and this was present in both the intended learning outcomes and the assessment criteria. However, there were only two example proposals provided, and little scaffolding related to writing. In particular, no scaffolding was provided regarding what constituted a persuasive or thorough proposal. Further, the connections between required sections, such as budgets and planning, were not made explicit or explained during class sessions, or in lecture material. There was, therefore, less provision of scaffolding activities and knowledge resources in proposal writing in comparison with the other aspects of the project, although this was deeply embedded in the assessment evidence and criteria, and is the area with which students could be expected to have greatest difficulty.

Secondly, there was some inconsistency in relation to the assessment of presentations. The learning outcomes indicated a requirement for professional verbal and visual presentations. Scaffolding for the development of presentation skills was also provided during class sessions in the form of practice presentations. While detailed criteria were provided for all other aspects of the project outcomes, no specific criteria were given for presentations, nor were there specific knowledge resources or explanation of criteria around presentation requirements evident in class sessions. There was thus less explicit acknowledgement and depth in the criteria for presentations than in other aspects of the project. Given that the presentations comprised 25% of the project grade and that there was an emphasis on presentation quality in the intended learning outcomes, class activities and scaffolding, the lack of
criteria for presentations was inconsistent with both the level of wider emphasis on presentations and the level of detail in the criteria for other aspects of the project.

Finally, although innovation was listed in the assessment criteria for this project, there was little explanation of the term, nor emphasis on it, in the scaffolding. Lectures did not elaborate on the meaning of the terms or the nature of the expectation. Although set activities included concept development, it was not clear to me, as the teacher, how innovation might be defined, evaluated or assessed. I therefore did not weight innovation heavily in the grading process, although I did comment on the subjects of the proposals with regard to their capacity to deal with problems in novel ways. Students did not raise this as an issue, but it was nonetheless problematic from my perspective.

Dispositional consonance

The project was structured around:

• A high level of independent investigation and team-based decision-making

• A broad brief allowing for highly individualised proposal concepts and few limitations other than a need to identify and resolve a community problem, with teacher control centred on the format of the proposal document

• Loosely defined stages and early set activities focused on progressing project processes

This data showed a mid range degree of explicit teacher control over the processes and a relatively low degree of control over the conceptual development aspects of the project. This was particularly evident in the level of responsibility students were expected to demonstrate in relation to identifying and developing their proposal. In line with the explicit locus of control in the project, I provided:

• An overall framework for the project outcomes and some set tasks

• General instruction focused on building skills around project management processes

• A mix of whole group discussion and individual consultations
This suggests that the level of teacher control was consonant with that explicit in the project structure. Students also acted in line with this expectation, namely they:

- Completed most work between class sessions, including investigation, proposal development and progress meetings with their teams
- Developed their project concepts without direction, seeking feedback when they felt it necessary but also selectively following advice and justifying their choices

Based on this data, students took a high degree of control over, and responsibility for, their project content. In contrast, lower levels of student control were noted in the proposal preparation. This was the area noted above as dissonant with both articulation and categorical concurrence. In the notes on interaction styles, there was some variation in approach depending on the project stage. Particularly that I:

- Dominated individual consultations in the early sessions
- Took a questioning/affirming stance in the latter sessions

This appeared consonant with the locus of control in the project, that is, with students having the greater degree of control over their learning. The interaction style of students also indicated a higher level of active behaviour. In particular they:

- Did not wait for permission to start work or comment on instructions or the work of others
- Requested changes to activity for additional support or different emphasis
- Argued for their decisions, using knowledge gained from investigations, logic and team-based decision mechanisms

This active behaviour also reflected the high levels of independence laid out in the project structure. Teacher and student dispositions therefore appeared aligned with one another, and with the project requirements, with the exception of the level of instruction regarding proposal writing. As in B1, B2 and B3, students were highly active and the noise level in the classroom was high. Qualified by the difficulty in achieving the written outcomes, students also reported enjoying the experience. This accords with my experience of the interactions during class sessions, and my perception of the level of engagement with the project development from students. I would therefore suggest that overall there was dispositional consonance in this
project, but that the proposal writing remained difficult to manage in relation to the
locus of control.

Equity

The project was structured around active investigation and required students to
generate and take ownership of their concepts from very early in the process. The
 equitable aspects of the overall project structure can be summarised as:

- All students provided with the same project brief and overall tasks, with scope
  for individualisation
- All students having opportunities to investigate, gather resources, and tailor
  choices to their preferences/strengths
- Flexible timeframes for each stage and activity, allowing students to spend
  longer on more difficult tasks and return to them if necessary
- A wide range of activities including investigations, concept development,
  problem-solving, writing, presentation
- Assessment evidence the same for every student, including developmental
  work and final outcomes
- Sufficient flexibility in criteria for grading to a balance of strengths and
  weaknesses

This evidence suggests that the project was equitable in relation to providing
students with varied opportunities to learn and to demonstrate their learning. The full
range of intended learning outcomes was identified in the criteria for assessment.
Students were provided explicit opportunities to demonstrate strengths in a wide
range of project aspects, including teamwork, written arguments, data gathering,
budgeting and presentation skills. There were also several opportunities for students
to practise and test their ideas and outcomes through activities, including peer
reviews, practice presentations and benchmarking.

The use of group assessment, as with B1, did cause some challenges. The methods
used involved a combination of group mark and adjustments to individual grades
through team feedback. The relatively minor variations that could be allocated based
on team feedback were intended to provide students with individualised recognition for their contributions, but were not sufficient to account for any significant variations in student contributions. While this did not appear to have major effects on student perceptions of the curriculum, it was not an equitable approach with regard to the final grades and in relation to the recognition of individual learning.

Case C2

The notes taken for this case indicated that students had demonstrated some difficulties with the project, and that work had appeared to stall on several occasions for some teams. Two students also raised concerns regarding the relevance of the project to the range of discipline groups involved. As with C1, at the conclusion of the unit, I also noted that the learning outcomes in relation to the quality of the writing, and in particular, the structure and depth of analysis and argument, were not as high as expected.

Articulation

As with C1, the key characteristics of students in relation to articulation can be summarised as:

- All were third year undergraduate students, nearing the end of their degrees in a variety of design discipline areas
- Given the nature of the faculty programs, they were likely to have extensive experience in team based/independent design projects
- They had all completed C1, and therefore had experience of working in multi-disciplinary teams and projects with written/presented report outcomes

As with C1, the multi-disciplinary nature of the student cohort meant that there was some difficulty in ascertaining the level of prior experience in knowledge domains. However, the same cohort of students had completed C1. Team composition was maintained for C2, allowing students to maintain and build on the team management mechanisms that had been developed in C1. As a result, the level of the student cohort could be assumed to include capacity to independently gather information and resources and to develop written proposals. They were unlikely to have carried out
formal research processes such as interviews or analysis. In addition, the topic of the project was branding strategy, of which only some students were likely to have prior knowledge. While this project was short in timescale, with only 3-5 weeks for development, the scope broadly reflected the expected level of student capacity, namely:

- Short, loosely-defined stages with a single report outcome
- Structured investigation and data gathering
- Development of an argument and report writing
- Working in multi-disciplinary teams

Students were also expected to:

- Follow instruction and comply with guidelines and timeframes in relation to carrying out interviews
- Complete decision-making and proposal writing work independently within the given framework
- Demonstrate the capacity to integrate of knowledge domains with empirical data and develop consistent arguments

The project was scaffolded through:

- Provision of interview questions, protocols and templates
- Guidelines for reports covering required topics
- Individual consultations, peer feedback and open discussions

The project scope therefore appeared largely consonant with the expectations regarding students' level of prior experience in relation to the project process.

Some aspects of the project were less clearly consonant with students' level of prior experience. Specifically, although students were expected to carry out the interview independently, to gather appropriate data and to use theoretical knowledge of brand strategy to develop a critical report, they did not have prior experience of carrying out these activities. Although there was some guidance for the interview process
emanating from the interview questionnaire and data-recording sheet, there was little in the way of knowledge resources, set activities or guidance provided about their application to an argument. This was demonstrated in a lack of depth of analysis, critique and theoretical knowledge in the final reports. As with C1, there is more than one possible explanation for this. First, that the expectations regarding the content of the reports may have been higher than reasonable. Secondly, that the project, which was allocated only a few weeks at the end of semester, did not include sufficient time for students to gather the required knowledge resources or to develop their arguments in any depth. Thirdly, that the scaffolding in these areas was insufficient. The scaffolding issue, as with C1, is also identified in categorical concurrence. The most likely explanation is that all three of these variables were misaligned with the likely level of student capacity and scope of the project, and that balanced alterations to these variables would have improved articulation in this case.

*Categorical concurrence*

The data showed a general coherence in the representation of topics, depth and breadth of emphases in knowledge, capabilities and qualities across the project scope, intended learning outcomes and assessment evidence. Specifically, these can be summarised as a repeated focus on:

- Application of theoretical, situational and procedural knowledge
- Independent analysis and development of reports
- Written and verbal presentation of outcomes
- Project and team management
- Self and peer evaluation

There was strong coherence between the teamwork aspects of the project, the scaffolding provided in C1, the structure of the project task and the assessment. The use of self-assessment and peer assessment supported the self-evaluation processes embedded in the requirements for students to work effectively as an interdisciplinary team and to carry out appropriate project management processes. There was also concurrence in the emphasis on data collection and the report contents, as well as the use of templates and protocol documents.
Nonetheless, several instances of dissonance were noted. In particular, data collection and analysis aspects of the process were not clearly outlined in the assessment criteria. Further, as noted in the evaluation of articulation, there were several instances of dissonance noted in relation to the intended learning outcomes and the type of scaffolding provided. In particular, there was little concurrence between the lecture content and the processes or topics of this project. While lectures during this project largely focused on project management, they did not cover the required knowledge, such as research and analysis approaches or any theoretical depth around brand strategy and its application.

In addition, as with C1, presentations formed 25% of the grade. This was well aligned with the emphasis on presentations in the scaffolding and intended learning outcomes. However, the lack of detailed criteria for presentations appeared at odds with the detailed criteria provided for the reports. As for C1, therefore, there was less explicit acknowledgement and depth in the criteria for presentations than in the written parts of the project.

This project, therefore, showed several instances of dissonance in relation to the categorical concurrence. The most important of these was the lack of congruence between the scaffolding and project scope. In my view, additional time and/or more closely aligned scaffolding would have significantly improved project outcomes.

\textit{Dispositional consonance}

The project was structured around:

- Clearly defined and detailed interview recording procedures
- Written and verbal presentation of reports
- A high level of independent work
- Loosely defined stages with few set scaffolding activities

There was thus a high degree of explicit student control over carrying out the project, but set within guidelines for the interview recording procedures. Explicit student control was present in some activities, particularly in selecting the organisation, carrying out the interview and developing the report. These aspects of the project
were in line with the explicit locus of control of the project resting with the students. In line with the lower level of teacher control in most aspects of the project, I provided:

- A framework and general instruction for project tasks including deadlines and reminders regarding timeframes for tasks
- Individual consultations including prompts for concepts to be considered and general feedback on progress

This means that the level of teacher control was consonant with that explicit in the project structure. Little control was exerted over the way in which students selected, carried out or analysed the interviews, nor on the report writing itself. Students were expected to work within the expected framework independently. I set direction at the beginning of each session and provided information about requirements, but did not set project direction. As with C1, consultations with teams were short and focused on clarifying progress, raising questions and suggesting approaches to solutions.

Students also acted in line with the explicit locus of control in the project, namely they:

- Selected organisations, carried out interviews, completed reports without direct instruction
- Completed most work between class sessions, including interviews, data analysis, report development and meeting with their teams

Students, therefore, took a high degree of control over, and responsibility for, their project content. However, they also:

- Expressed uncertainty, concerns about progress and low confidence levels
- Did not consistently meet deadlines and more often delayed decision-making
- Often waited for prompts before moving forward

In summary, the teacher disposition appeared to be aligned with the project structure and requirements, and students responded to the project by carrying out the work without structured support. The teacher interaction style was also aligned with an expectation that students could achieve the outcomes without structured support. Yet the students generally appeared passive, tentative and unsure of their direction. As a
consequence, and despite high levels of apparent student engagement during classes, student interactions did not reflect the level of activity, self-regulation and confidence that might be expected in a highly independent project. This reinforces the problems raised in articulation and categorical concurrence. Specifically, students did not have sufficient support to complete the work at the expected level or with the required level of control. This suggests that while the teacher disposition was aligned with the project requirements, it was not aligned with student needs.

*Equity*

The project was structured around active investigation and required students to generate and take ownership of their concepts from very early in the process. The equitable aspects of the overall project structure were similar to those found in the previous projects, particularly those found in C1. These can be summarised as:

- All students provided with the same project brief and overall tasks, with scope for individualisation
- All students having some opportunities to investigate, gather resources, and tailor choices to their preferences/strengths, although to a lesser degree than found in C1
- Within a constrained schedule, relatively flexible timeframes for each stage and activity, allowing students to spend longer on more difficult tasks and return to them if necessary
- A reasonable range of activities including data collection, analysis, writing, presentation
- Assessment evidence the same for every student, including developmental work and final outcomes
- Sufficient flexibility in criteria for grading to a balance of strengths and weaknesses

The full range of intended learning outcomes was identified in the assessment. As with all of the projects, students were provided with explicit opportunities to demonstrate strengths in a range of project tasks, including teamwork, written arguments, data gathering, and presentation skills. In contrast, there were few
opportunities for students to practise and test their ideas and outcomes through activities, resulting in less than the desired depth of learning and outcomes.

As with C1, this project was also assessed with group grades, adjusted for individuals on the basis of team feedback. Although there was no evidence of particular inequities as a result, this was more likely the result of overall low student progression than the equity of the process.

I would, therefore, argue that this project provided sufficient, but not optimal, opportunity for all students to learn and to demonstrate their learning.

Conclusions

Articulation

The analysis of articulation focuses largely on whether the project is within an appropriate range of complexity in relation to students' prior experience and the level of the program. In the analysis, it became clear that it was easier to judge whether projects were within student capabilities than whether they were sufficiently complex. In B1 and B3, the projects appeared well within student capacity and students were easily able to complete the work at the desired level. In B2, minor adjustments were made over the project period to accommodate student needs. In particular, the shift to a more independent mode of working appeared to cause students some difficulties. This did not appear to be a significant issue, as minor adjustments to scaffolding enabled students to move forward. In A1, there were more significant indications that the students may not have had sufficient prior experience to cope effectively with the visual and verbal presentation aspects of the work at the level required.

This was not conclusively a problem of articulation, but was further identified as potentially emanating from categorical concurrence and dispositional consonance. In C1 and C2, similar issues were noted in the written aspects of the projects. In particular, students did not have sufficient prior experience to complete the written outcomes to the expected level. In C2, additional problems were noted in the alignment of student experience with the requirement for interview data analysis and theoretical knowledge on the topic. The time allowed for the project also appeared insufficient given the scale of the task and the relative timeframe in comparison with
C1. As with all the findings around the evaluation of congruence in the projects, several possible avenues for resolution were identified, including increases in scaffolding or adjustment of the criteria.

These findings demonstrate that there are challenges associated with the broadening of curriculum outside of the practice of design itself. Notably, most of the aspects of the projects that did not demonstrate congruent articulation were also those that were least likely to have been formally taught in teachers’ own prior educational experiences as students, although part of the role of professional designers, that is, presentation delivery, written communications, and textual analysis. Given the complexity and range of scaffolding needed for projects, my conclusion is that this is an error in the curriculum structure, influenced by the challenge of balancing scaffolding and a tendency to privilege project and design procedures over less familiar areas.

**Categorical concurrence**

There are several dimensions of project content that design educators have to balance in the design of the project curriculum. In this thesis, the curriculum model identifies these as variables and sub-variables that include teacher and student roles, scaffolding and support mechanisms, project activities and assessment. Across each of these variables, there are also multiple domains of learning focus in the development of student capability, such as technical capability, creativity, and theoretical, procedural and situational knowledge (Clews, 2003). Thus the problem of identifying alignment is multi-dimensional and highly complex.

Projects were generally well aligned across the categories in relation to the consistency of representation of concepts. In B1, B2, and B3 there appeared to be fairly consistent use of concepts with only minor variation. In all of the cases to varying degrees, creative and aesthetic criteria were present but not consistent across all categories or well articulated, raising questions about whether these concepts were dealt with sufficiently clearly. This reflects some of the concerns raised in the literature on design education. In particular that teachers of design have difficulty in managing and articulating concepts around aesthetics (Blair, 2006b; Percy, 2003).

There were also some issues with the use of theoretical knowledge. In A1 and C2, theoretical knowledge was evident in the intended learning outcomes but not explicit
through the project process or in assessment. While this did not appear to be cause for concern for the teacher in A1, it did impact on the learning outcomes in C2. In particular, students were given no scaffolding around the required theoretical knowledge although they did not have prior experience and there was insufficient time available for them to gather and assess knowledge resources independently. As a result, students were unable to carry out a meaningful analysis of their data as required by the project brief. The lack of theoretical knowledge in design education has been widely recognised. In particular, several authors argue that this limits development of the intellectual capacity of students, and is problematic in relation to the accepted role of university education (Blauvelt, 1997; Durling & Griffiths, 2000; Friedman, 2000).

In C1 and C2, there was strong coherence in the team and project management aspects of the project. There was less coherence in the development of writing skills, in particular that there was less provision of scaffolding support and knowledge resources for those parts of the project. As demonstrated in C1, the issue was one of emphasis. Teamwork and project processes were prioritised over knowledge content in the support mechanisms. It is therefore possible that the capacity of teachers to provide scaffolding, the perceived importance or need for particular types of support, and the time available for delivery, impact on the congruence of some concepts across variables. In these two projects there was also incongruence between the highly detailed criteria for most aspects of the project and the lack of criteria for presentations.

Categorical concurrence demonstrates the complex nature of curriculum content, and as noted by Winne (2006), the potential for ‘combinatorial explosion’. This was the most difficult area to evaluate, with enormous numbers of concepts, interacting with activities, resources, discussions, and criteria. Nonetheless, gaps in delivery in each case were relatively clear. Only a few types of incongruence were repeated across the cases. The most striking of these overall were the use of concepts around creativity and innovation, and theoretical knowledge that were poorly described and inconsistently applied.

**Dispositional consonance**

According to the literature, teacher behaviours, scaffolding activities and resources in project methods should be targeted to the level of the cohort or their degree of
experience (Barron, et al., 1998). Teachers can find this difficult (Thomas, 2000). Indeed, concerns voiced in the literature regarding design education indicate that traditional studio practices encourage more dependent and passive approaches to learning than has previously been assumed. Ashton (1997) comments that teachers tend to dominate discussion in the studio, while Green and Bonollo (2003) argue that students can become overly dependent on teachers. Hedley et al (2007, p. 8) concur that the studio environment ‘allows the lecturer to develop control and often power based relationships with the students’, and that there is ‘a risk in this relationship of co-dependency where the student depends on the lecturer for knowledge while the lecturer enjoys contributing directly to the work and the student’s learning’. In her study of critical review processes in design education, Blair (2006b) found that students were usually invited to contribute only by being asked if they had any comments and only after the teacher had given their opinion.

In A1, the project scope indicated a high level of autonomy for students, suggesting a low degree of regulatory activity for the teacher. However, the data showed that students and teachers took apposite roles, with students appearing passive and more tentative than the project scope suggested. Similarly, the teacher appeared to take a more directive approach to interaction than suggested by the project level. While in B1, B2, B3 and C1, the teacher and student roles aligned well with the relative scope of the projects, in C2 the teacher’s approach displayed reverse problems to those in A1. In other words, the teacher was collaborative, while the project and student level of prior experience called for a greater degree of guidance. In both A1 and C2, students did not progress the projects at the speed required and appeared tentative in their approach. I can conclude that in A1, the teacher and student roles would have better aligned with the project levels with a reduction in the dominance of the teacher and an increase in active contribution from the students. Equally, the findings in C2 suggest that the student level of capability required a higher degree of scaffolding and direction from the teacher, and a reduction in the expectation of student independence.

In this study, there was therefore wide variation in the locus of control in relation to the projects and in the interaction styles of teachers and students. The findings also showed that teacher and student behaviours are not always aligned to the explicit levels of independence embedded in projects. The issues arising in A1 appeared to reflect some of the critiques of studio practice, particularly the issues noted above regarding the dominant role of the teacher. Specifically, the teacher took a directive
approach to interactions with students and tended to be punitive. Nevertheless, it is not necessarily the case that teacher dominance is the only issue. As demonstrated in the analysis of each project case, the variables interact to the degree that it can be difficult to identify singular causal relationships between variables. In some cases, as in A1 and C2, it is more likely that the teacher approach is the primary issue.

Interestingly, in the teacher interviews and my own reflective notes, there was little indication that any of us were able to identify that their behaviours formed part of the curriculum and would impact on student approaches to tasks. My notes about in-class activities similarly did not give the same degree of explanation of my behaviour towards students at various points in the project process that was given to the activities, resources and project tasks. It was also more common for teachers to reference student capacity and behaviour as the primary influencing variable on outcomes. While teachers were able to describe their overall approach to teaching, they did not therefore appear to give equal weighting to teacher and student behaviours. This is a strong indication that teachers underestimate the importance of their role in the curriculum.

**Equity**

Many authors have argued that project methods afford multiple opportunities for learning and assessment, both of which are integrated with the project process. Projects involve learning through a variety of project tasks and requirements, as well as a variety of feedback mechanisms (Barron, et al., 1998; Kilpatrick, 1918; Lee, 2006). Projects are also generally equated with opportunities for students to devise their own paths, work in ways that reflect their strengths and interests, and to devise outcomes that are demonstrative of multiple learning processes (Adderley, et al., 1975; Barron, et al., 1998; Kilpatrick, 1918).

Project tasks in the cases studied generally gave all students multiple opportunities to learn, and to demonstrate learning, through a range of activities and processes. Equally, the project evidence and criteria afforded assessment of a variety of strengths and weaknesses in a wide range of domains. In B1, B2 and B3, the whole of group teaching practice meant that there was clear equity in learning opportunities. The project tasks and criteria in each case were also structured to allow students to demonstrate learning in a variety of domains. However in A1, the individualised approach and curtailment of some activities meant that there were not always
equivalent opportunities for students to gain feedback or practise presentation skills. Moreover, the inequity of opportunity to engage in these activities did not appear to be related to the student need. Students who demonstrated good progress and outcomes were also those who were afforded more opportunities to present work and gain feedback. There was insufficient data to come to conclusions about whether the higher-level learning outcomes were solely the result of the existing capabilities of those students, or whether early teacher support increased their capabilities and this led to more opportunities for feedback and support.

In all of the projects there was some use of aesthetics and creativity in assessment. In A1 the assessment process tended to preference students who did well in this domain over students who did well in the technical aspects of the project, or potentially those who displayed greater learning across the project challenges. It is widely argued that innovation and creativity are rewarded more highly than the completion of assessment requirements in design education (Blair, 2006b; Davies, 1996). There is also some evidence that design teachers tend to differentially describe the aims of courses or expectations of students and their actual criteria for assessment. This did not appear to be problematic in the other projects, where equivalent emphasis was given to the range of criteria. Rather, it seemed to be a problem of inconsistent articulation of the meaning behind the terms, particularly in assessment criteria. Nonetheless, the articulation and development of outcomes in relation to creativity and aesthetics were clearly problematic.

The use of group work in B1, C1 and C2 reflected a concern with the social experience of learning and authenticity with professional practice. Group projects provide students with a context for reflexivity and development of understanding of social and cultural codes, through presenting ‘their understanding and receiving feedback on its meaningfulness for others’ (Nielsen, 1999, p. 115). Nonetheless, group project work is widely recognised to present some challenges for equity in learning and assessment. Several authors have commented on the use of team projects and the inherent difficulties of student collaboration, work distribution and equity in assessment (Adderley, et al., 1975; Delucchi, 2007; Helle, et al., 2006; Langrish & See, 2006). The assessment of group work to ensure individual recognition remains a particularly difficult issue to resolve. In B1, this issue was noted with the use of group assessment for highly individualised, and personalised, learning outcomes. Although, in C1 and C2, some of these issues were addressed by the inclusion of peer assessment, it cannot be concluded that the use of peer
assessment resolved all of the difficulties associated with recognising individual contributions and achievement equitably.

Chapter summary

In this chapter, the evaluation of congruence within each case has been presented. Commencing with a brief overview of the existing models for the evaluation of curriculum, the selection of Webb’s criteria for the evaluation of congruence in the curriculum, and the subsequent adaptation of those criteria for this study has been described. Working within the scope of the thesis, the criteria were reduced to provide a balance of representation of congruence between student capacity and overall level of the project requirements, consistent representation of concepts within the curriculum, relationships between teacher and student behaviours and the projects, and the equity of the curriculum in relation to opportunities for learning and the assessment of learning.

There were multiple aspects of the curriculum than could be adjusted. Making a decision regarding which should be adjusted is a matter of judgment and of the degree to which particular variables are privileged in the curriculum. In this thesis, the basis of that judgment privileges the alignment of the project with the program level, desired outcomes, and the degree to which these align with perceived student capacity. As demonstrated in each case, there was general congruence across the projects, with some specific areas of dissonance in each, and a limited set of common issues. A1 and C2 in particular showed the strongest levels of dissonance, with incongruence in parts of the articulation, consistency of concepts and teacher/student behaviours. These concepts re-emerged in the analysis of commonality and variation and are, therefore, further elaborated in the chapters that follow.
Chapter 6:
Analysis of common characteristics across cases

This chapter presents an analysis of the common characteristics of the projects reviewed for this study. As will be shown below and in Chapter 7, B1 does not qualify as a project but can be more appropriately labelled a project-oriented activity. As a result, data from B1 were excluded in the analysis of the common characteristics of projects. Findings from the analysis across the remaining projects showed that the remainder of projects shared a number of characteristics. While not necessarily exhaustive, the collective description of those characteristics provides a propositional definition of the nature of projects in undergraduate design education.

Existing definitions of project methods

In the introduction to this thesis, Adderley et al’s (1975, p. 1) summary definition of project methods was presented. This was that:

• They involve the solution of a problem; often, though not necessarily, set by the student himself.

• They involve initiative by the student or group of students, and necessitate a variety of educational activities.

• They commonly result in an end product.

• Work often goes on for a considerable length of time.

• Teaching staff are involved in an advisory, rather than authoritarian, role at any or all of the stages – initiation, conduct and conclusion.

Helle et al (2006) argue that this definition of project methods remains relevant, and that in particular, the presence of a problem situation and an end product are essential elements of the project method. Drawing on cognitive psychology, they further describe the project method as having five important characteristics:
- Problem-orientation – involving the collection and integration of prior examples, reflection, knowledge restructuring, dealing with complexity and development of expertise

- Constructing a concrete artefact – reinforcing steps in the development or construction process, engendering complete knowledge structures, and enabling continuous task-oriented interaction between teachers and students

- Learner control of the learning – allowing students to work their way through problems in relation to pace, sequence and content, activating prior knowledge and increasing the degree of experiential knowledge which can be activated in subsequent problems

- Contextualisation – facilitating the connection between topic and its application, enhancing authenticity and the capacity of students to retrieve appropriate knowledge and experiences in similar circumstances

- Multiple forms of representation – the integration of interdisciplinary theory and practice and use of varying forms of conceptualisation (e.g. abstract, concrete, verbal, textual, visual) associated with the process of building mental models and knowledge maps

In the broader literature, no dissent regarding these characteristics of project methods was found. Authors unanimously agree that projects are structured around a problem or ‘driving question’, involve student initiative and variation in learning activity, and that teachers provide guidance rather than didactic delivery of knowledge resources (Barron, et al., 1998; Mergendoller, et al., 2006; Mills & Treagust, 2003; Thomas, 2000). In addition, a number of authors have described projects as comprising a process of investigation, being profoundly social, experiential and authentic to the real world or to professional practice, and engaging students at a personal level (Barron, et al., 1998; Blumenfeld, et al., 1991; Gulbahar & Tinmaz, 2006; Mergendoller, et al., 2006). This engagement, it is argued, promotes a degree of self-regulation and ownership of the work that fosters ‘the experience of agency, belonging and competence – the prerequisites of intrinsic motivation’ (Helle, et al., 2006, p. 294). Assessment is based on the work carried out during the project process, and on the products of the project, often evidenced by a portfolio of outcomes and supporting material demonstrating logical progression through investigative processes (Armacost & Lowe, 2003; Askeland, 1999; Borgnakke, 1999;
Gulbahar & Tinmaz, 2006; Lima, Carvalho, Flores, & Van Hattum-Janssen, 2007; Tochon, 2000).

With the exception of B1, all of the projects reviewed in this research study were structured around a problematic situation requiring students to take investigative action leading to a physical product. In every case, the nature of the product was defined, and all of the formal activities and resources were directed toward its development. The products were thus the primary focus of the learning experience. Each project was also designed to incorporate a range of activities that were integrated in the final product or products. During this process, students were expected to take some initiative in managing their activity.

Other characteristics of projects are not so clearly defined and are worthy of re-examination in relation to the data. For example, the time allowed by Adderley et al (1975) is ‘considerable’. In the previous chapter, it was shown that there are variations between the allocated times for projects, depending on the complexity of the problems and the scope of requirements. The data also showed some deviation from the concept of teachers as guides. As shown in the previous chapter, teachers and students take on varying levels of control and types of behaviour in projects depending on a range of interacting factors, including the perceptions of student capabilities held by teachers, and the project scope and complexity. The projects therefore met Adderley et al’s definition of project methods to some degree, but not exclusively so.

For the most part, the project cases also met Helle et al’s (2006) definition. Each project was clearly problem oriented with a degree of complexity that varied according to the level and scope of the project. Students were expected to gather knowledge to inform the work, and to bring their previous knowledge and experience to bear on decisions regarding the form and content of the projects. As noted above, each project also required students to carry out the development of a concrete artefact, on which the learning process was focused. During this process, there was continuous, task-oriented interaction between students and teachers and, in most cases, between student peers. More generally, the project delivery included gaps in instruction which provided students scope to manage their pace and sequence of activity, and to select some of the conceptual or visual direction for their work. Finally, the work was contextualised in each case by the presence of aspects of professional design projects: for example, imagined or real briefs, locations, and audiences.
There was less evidence that students were using or linking multiple forms of representation. Although they were in some cases linking between verbal and visual forms, as will be seen, there was an imbalance between the forms of knowledge used, and little evidence of the explicit integration of theoretical knowledge with practice. The literature is also poorly developed in relation to the types of knowledge acquisition and inquiry embedded in the project process. While a number of authors argue that knowledge is integrated in the process, that students are able to more comprehensively map knowledge with previous experiences and that knowledge retention is improved (Barron, et al., 1998; Helle & Tynjala, 2004; Railsback, 2002), there is little in the way of definition of the types of knowledge and how it is embedded in the project process. This may be a result of the varying nature of projects but, as indicated in the previous chapter and further argued in Chapter 7, there were specific types of knowledge emphasised in the project cases.

These findings demonstrated that although most aspects of the current definitions were salient, they were not exhaustive of the study data. In addition to the general characteristics of investigation around a problem situation, a culminating physical product, a variety of educational activities, student initiative and portfolio assessment, a thematic analysis of the data showed three broad areas of commonality across the projects that were striking. These were:

- Emphasis on professional authenticity
- Prevalence of particular groups of knowledge and skills
- Interdependence of educational processes

In the following section, each of these characteristics is described in relation to the data.

**Professional authenticity**

Teachers described the projects as reflecting their own experience of professional design practice. During observations of classes, it was also noted that they regularly referred to their own experience in relation to design practice. In all of the project cases studied for this thesis, teachers said that the intent of the projects was to initiate students into professional practices. They also referred to the projects as
simulations of the tasks carried out by professional designers. Specifically, they referenced the use of authentic problem situations; navigation of constraints or limits; the use of briefs; staged, iterative processes; the presence of an external audience or user group, and; public review. All of these characteristics were present in all of the project cases. Each will now be discussed in turn and their link to the notion of professional authenticity explored.

**Authentic problem situations**

In all of the project cases studied, students were presented with a bounded but somewhat ill-defined problem or set of problems based on a hypothetical professional situation, as conceived by the teachers. This was reflected in the overall shape of the projects. In A1, students worked through the stages involved in developing a complete set of designs and design specifications for a given (real) location. In C1, students worked to a tender document that was grounded in a real requirement for projects associated with the local government strategy. In C2, similarly, students carried out interviews and delivered reports replicating those completed by designers in projects associated with brand review. In B2 and B3, students worked on projects for event marketing and symbol design respectively. Both of these projects reflected the kinds of projects carried out by contemporary visual communication designers.

Although, as indicated in the previous chapter and further demonstrated in Chapter 7, the number of problems and the degree of complexity varied, in each case there were also emerging problems that became apparent as the project development progressed. Such problems were generated through increasingly detailed understanding of the problem situation and the associated constraints, tentative solutions for parts of the problem generating challenges for integration, and the technical, conceptual or procedural problems generated by incomplete or unsuccessful attempts at solutions. The steady evolution of design problems through understanding of problem situations and the navigation of tensions in their solutions is also reflected in the literature on the nature of professional design practice (e.g. Booth, 1983; Nini, 1996; Crouch & Pederson, 2000), design problems (e.g. Buchanan, 1992; Coyne, 2005; Rittel & Webber, 1973) and design problem solving (e.g. Dorst, 2004; Eisentraut, 1999; Goker, 1997).
Navigation of constraints or limits

All of the problems also required the negotiation of constraints, either by reference to the project scope or as a result of problems encountered in the development of solutions. The project constraints varied in number and level of complexity, with variations in the primary or leading constraint, i.e. budgets (C1), research process rules (C2), type of site (A1), and production limitations (B2/B3). In A1, students had to work with the constraints of building regulations. Students in A1, C1, and B2 also worked within technical or production constraints.

In the literature, constraints are described as the mitigating factors that impact on the complexity of a problem (Chevalier & Ivory, 2003; Savage, Miles, Moore, & Miles, 1998). The more interrelated and contradictory the constraints are, the more complex the problem and the more difficult it is to achieve a satisfactory and compliant solution. Savage et al (1998) identified three types of constraints on designers' activity:

- External constraints – such as time and cost
- Inherent constraints – characteristics of the product
- Internal constraints – knowledge and experience

The projects demonstrated all of these types of constraint. External constraints related to the educational context included the allocation of time, the scope of work and the criteria for assessment. Hypothetical and problem-bound constraints included budgets. All of the project cases studied also had inherent constraints. These included the limits of the problem presented and available data, purpose of the product, acceptable formats for outcomes and required content of outcomes. The internal constraints, dictated by the level of prior experience of the students, varied more significantly. Nonetheless, in all cases students were expected to critically apply their existing knowledge and experiences as users to the development of solutions. While there were limits to the authenticity of the design problems and their constraints as a result of the simulated nature of the work, the constraints set for projects nonetheless reflected those found in the literature on professional design practice, that is, limits to budget, time, client requirements and desirable outcomes (Savage et al, 1998; Chevalier and Ivory, 2003).
Use of briefs

All of the projects reviewed for this study commenced with a project brief devised by the teacher. Briefs were written as simulations of professional practice, using imagined situations but phrased as if they were professional briefs. The use of briefing documents reflects the literature on professional design practice, where it is generally held that design projects are generated by, and outlined in, a client brief (Friedman, 2000; Tan, 2009; Wild, 1997). Briefs usually provide background client information, a description of the scope of work and rationale for carrying out the work, and constraints such as budgets and timelines for completion. The briefs provided in the projects studied also tended to include detailed background information (imagined scenarios), to indicate some of the challenges and contextual issues that would be faced, the design stages and constraints. In a variation from professional briefs, they also included both conceptual structures for the work and details of the assessment criteria. The use of briefs to define concepts and activities over the project delivery period reflects Ozturk and Turkkan’s (2006) argument that the project brief is commonly used as a ‘structuring device’ in design education and the Tan (2009) and Nini’s (1996) view that briefs are the primary early communication and negotiation device between professional designers and their clients.

Staged, iterative processes

Stages were also embedded in every design brief and formed the primary structure for activities in the projects. The initial stages of the case projects commonly involved two broad phases that reflect Nini’s (1996) description of the design process: investigation of the design problem and the development of strategies, followed by developing design concepts and refining the solutions in iterations. Teachers in all of the cases argued that the staged process performed three important roles in the projects. First, by breaking down the project into manageable chunks, students were not overwhelmed by the messiness of the problem and the complexity of the overall project. Secondly, the stages reinforced structured development processes while allowing students to present work at interim stages (see iterative development, below). Thirdly, the stages allowed teachers to manage the delivery of projects by providing relevant resources and guidance across the class group to meet project development needs. In most cases, sufficient flexibility was incorporated into the schedule so that adjustments could be made to the timing of stages and interim deliverables.
Interim deliverables were not necessarily completed items – they were often drafts or first attempts at aspects of the work that could then be reworked prior to summative assessment. According to Rittel and Webber (1973), tentative designs provide the means of determining direction and navigating between client and designer interpretations of the brief. In the educational context, the presentation of tentative solutions enabled students to make attempts at resolving design problems, gain feedback or consider their outcomes, and reflect on progress before embedding the decisions by refining or incorporating into the overall project. For example, in C1, students carried out an initial group process development, followed by investigation and concept development. Outcomes from this stage were evaluated by peer review prior to further work being carried out. Final concepts were then tested through draft reports. In the final stage, students developed their reports and presentations. Each stage was structured so that students completed a process and interim outcome before moving on to subsequent stages, revising previous solutions. Iterations of development, therefore, acted as building blocks for completion of the final project outcomes, much as they do in the professional design processes described by Tan (2009), Nini (1996) and Rittel and Webber (1973). In summary, the staged, iterative, processes in the projects studied both reflected the structure of professional design projects and served a purpose in structuring and supporting the learning process.

**External audience or user group**

All of the projects were oriented to a nominal audience or user group. Some were oriented to a professional peer group as well as a user group in addition to the use of peer or teacher feedback. For example, in C1, the proposal document was to be oriented to a funding body but students were to orient their proposed event or product to the potential users: a community group. Similarly, in A1, the use of a design jury during assessment indicated that the primary audience were professional peers, while the design itself was to be oriented to library staff and users. In C2, B2 and B3, the external audiences were generally limited to users. In C2, students were to orient their proposals to the client organisation. In B2, the audience was a defined audience of peers. In B3, the audience was less well defined, being ‘the public’. Nonetheless, this project also included reference to an external audience whose needs were to be considered in the development of a visual solution.

In each case, the audience or prospective user group were referred to repeatedly during class sessions and across the project documentation. While in some cases
(B2 and B3) the audience group was less well defined than in the other projects, in each case students were given clear instruction that work should meet an audience need. Further, teachers cited relevance of the project outcomes to the user or audience need as the underlying rationale of the grading process. While there is little in the general design literature to indicate that serious consideration has been given to the user or audience orientation of design products and the impact of this on the work of designers, the concept of user orientation has been noted in the literature on design evaluation (e.g. Nini, 1994; Ulrich & Eppinger, 2003).

Public review

In addition to a concern with public or peer review, students were expected to engage in some form of public review of their work. In all cases, this included peer review. Peer review was built into the classroom activity in the form of in-class presentations (A1, C1 and C2), pin ups (A1), critical review activities (C1) and anonymous progress reviews (B2 and B3). In A1, C1 and C2, the final assessment also included a presentation of work to peers, and in the case of A1, to external reviewers.

Teachers argued that peer review was an important formative learning experience for students, in which they practised articulation and presentation of ideas, gained feedback on work in progress, and were able to begin the process of benchmarking their own work. Teachers further argued that public review, in the form of presentation of work in progress and completed designs to colleagues and clients, was a core aspect of the work of professional designers. The process of evaluation through peer review is also referenced in the literature regarding professional design practice. Both Nini (1994) and Savage et al (1998) argue that peer review is the most common means of evaluation in design. The social aspects of the process also reflect some of the benefits ascribed to studio models of design education (Bannerot & Patton, 2002; Blair, 2006b; Green & Bonollo, 2003).

Knowledge and skills

In the projects studied for this thesis, there was an array of knowledge and skills integrated with the project process. In the literature on projects in design education, it has been argued that project methods involve an emphasis on situational knowledge, problem-solving and creativity, but limited use of theoretical knowledge (Clews, 2003; Lewis & Bonollo, 2002; Lou & MacGregor, 2004; Penaluna, 2007). In the broader
literature on project methods, including in design contexts, there also tends to be a focus on procedural, technical and generic skill development (Barron, et al., 1998; Clews, 2003; Helle & Tynjala, 2004; Keskeys, 2000; Lee, 2006; Lewis & Bonollo, 2002; Penaluna, 2007; Smith, et al., 2009). In the projects reviewed for this study, similar levels of emphasis were found.

Situational knowledge

The findings showed that there was a significant degree of preference for situational knowledge acquisition, and critical inquiry related to problem situations, in all of the projects. For example, in A1, students were expected to establish a detailed knowledge base regarding the nature of the site, the complex challenges and tensions inherent in that site, and possible resolutions of those problems. Similarly, in C1 students were expected to gain detailed understanding of a community need. In C2, B2 and B3, there were less complex problems to address, but students were still required to gain some understanding of the underpinning issues relating to the problem situation and address these through iterations of reflection and refinement. The development of understanding of the problem context, and the interaction of issues arising from that context, were prevalent in the teachers’ descriptions of project tasks and their discussions with students about work in progress. According to teachers, the requirement for students to have engaged with these issues was also embedded in the assessment process, often related to criteria around exploration of problems and potential solutions, or the defence of outcomes.

Theoretical knowledge

In contrast, theoretical knowledge was given lower priority. While there was some evidence that students were exposed to, and encouraged to engage with, general theoretical issues, this was not consistent and did not appear to be reinforced through the project structures. The theory, when presented, was relatively superficial, restricted to general overview or repetition of standard paradigms. There was no exploration of themes or contradictions noted in the lecture or resource material. These ideas were not brought to bear during classes or in discussions between teachers and students. Further, theoretical perspectives were not integrated into the project content or processes. Students were, therefore, not required to engage with theory or philosophy in order to complete their projects. In A1, for example, students were expected to demonstrate knowledge and a degree of exploration around
exemplar work, but critical perspectives were limited to the development of personal responses to that knowledge through the design outcomes, rather than by explicit critique or comparison.

**Problem-solving**

Problem-solving was present as a thread of emphasis throughout all of the projects. At the core of each project, as has already been described, was a problematic situation which students were expected to address. This required students to assess the problem, gather information both direct and indirect to that problem, to identify potential solutions and to make decisions regarding the most appropriate course of action or ‘best fit’ solution within their capabilities. In all of the projects, the staged activities also required students to carry out continual evaluation of the problem or problem situation and solutions, and to refer to these in the context of the constraints, personal priorities, and design principles. Students were also expected to deal with emergent problems, generated through tentative solutions. Thus, the emphasis on problem-solving extended to both the problem as basis for the project, and the understanding and resolution of problems in the design process.

**Creativity**

Activities that represented creative problem-solving occurred in all cases, but were articulated in more detail at the lower levels. For example, thought maps (B3), brainstorming (B3/C1) analogy (B3) and generation of concept (all cases) activities took place in which students practised the generative parts of the problem-solving. In all cases students navigated constraints, project boundaries and problems, used procedural and technical knowledge and brought to bear their own experience in order to develop novel solutions. Cross (2006) provides the basis for identification of thinking activities that are related to creativity: mutation, analogy and reconfiguration of concepts. During individual discussions between teachers and students, teachers demonstrated these skills as they worked through the explanations of problems and solutions with students. Teachers modelled, rather than explicitly taught, creative problem-solving by using the thinking skills associated with the generation of novel concepts and solutions in response to problem situations.
**Procedural skills**

Procedural skills, or the development of the ‘how to’ of design, were clearly embedded in the project process. This was evident through the use of the projects themselves. Carrying out the project tasks required students to apply knowledge of design procedure. In B2, B3 and C1 in particular, the instructed tasks and project briefs made repeated reference to practising design procedures, including the rationale for these procedures. In each of these cases, students were provided information and explanation about the process of commencing with the details of the need, types of information required to form the basis of decisions, ways of approaching the design problem, the tasks that needed to be completed, and reasons for these tasks to be undertaken in a particular order. In A1 and C2, stages were set to include similar kinds of information and explanation, albeit with less detail about the smaller tasks. In all cases, it was not possible for students to complete the projects successfully without the use of these skills.

**Technical skills**

Although embedded in the project process and not subject to additional instruction, technical skill was expected in all cases. This included the competent use of software, manual skills in developing design visuals, and in the case of C1 and C2, formal written communication skills incorporating calculations and interview skills respectively. In A1 the use of technical skills was marked. Students were expected to demonstrate skills in building specification, including calculation, high levels of manual skill, visualisation and 3D software use.

**Dealing with complexity and ambiguity**

As previously noted, all of the projects also involved a degree of complexity with no single correct solution. This required students to navigate problems and to cope with decision-making without recourse to a single specific exemplar outcome. While teachers provided instruction regarding the nature of the problem situation, and the process and product requirements, there were significant gaps in this instruction that required students to manage their work. This was particularly the case with the investigative aspects of the projects, which were largely left to the students’ discretion and presented a wide range of possible issues and directions.
The projects also comprised multiple tasks that were interconnected, and could not be undertaken discretely. In each case, there were interim or partial outcomes related to either stages or problem aspects, all of which had to be integrated into a single cohesive end product. These challenges involved students in ambiguous situations for which there were no correct answers, and in which decisions were necessarily complex.

**Project management**

In addition to competency in design processes and technical skill, students were expected to demonstrate a range of generic project management skills including planning and managing tasks and schedules, maintaining documentation, using multiple modes of communication and negotiating meaning with others.

Students were also expected to progress projects outside of class time, with few concrete penalties if they did not do so. In each case, while project stages were generally set, there was flexibility in those stages that allowed students to return to tasks for refinement. In each case, the staged development also contributed to this. In the more complex projects, students were given more scope to adjust development activities in relatively long stages, while at the lower end of the scale, students were set short, detailed stages. In each case, the aim was for students to develop their project management and decision-making skills. Although the scope for self-management of schedules and tasks varied across the projects, in all cases some degree of project management skill was required. This process of negotiation of complexity was reinforced by the communication of progress to peers, and the requirement in all of the projects that students show capacity to respond to feedback, either that intrinsic to the project problems, or provided by peers and teachers.

**Educational processes**

In all of the project cases, educational processes were interdependent. That is, scaffolding activities, knowledge resources, assessment evidence and criteria, and student and teacher roles were designed to meet the needs of the project. This meant that, where congruent, they also varied in accordance with the project stage and types of product expected. Formal activities, including presentations, and resources were all linked directly to progressing the project. There were no adjunct
tasks or assessments that did not directly relate or contribute to the completion of the project requirements.

**Scaffolding**

In all of the cases studied, there was a variety of set scaffolding activities. These were broadly broken into four types: information gathering activity, formulating activity, generating activity, and evaluation activity. Information gathering included site visits (A1), interviews (C2), and finding examples (B2/B3). Formulating activities were centred on the acclimatisation to project processes, and included the setting of project rules or frameworks (C1) and planning exercises (C1/B2). Generating activities were centred on the generation of ideas or concepts and included brainstorming (B3), and drafting (B2/B3/A1). Evaluation activities included online discussion boards (B2/B3), individual consultations (A1/C1/C2/B2), cross-team ‘round-tables’ (C1), anonymous or critique style peer review (all), and practice presentations (A1/C1/C2).

Scaffolding activities were consistently set to mirror project stages. Information gathering activities and generative activities occurred at stages where students were expected to be exploring problems or solutions. Formulating activities were set at times when students were required to establish their plans for action. Evaluation activities were used toward the end of interim stages, and were designed to require students to articulate processes, argue for directions and seek feedback.

**Information resources**

In all cases, information resources were focused on the provision of knowledge necessary for project development. Presentations of information in lectures and in classes tended to cover relevant designers, design processes, materials or methods. In addition to the general in-class discussions, all of the cases included some information resources, including physical outcome examples from previous years (C1), procedural guides (C2/B2/B3), process-oriented lectures (C1/C2/B2/B3), principles-oriented lectures (B2/B3), presentations of professional exemplars (A1/B2/B3) and templates (C2/B2/B3).

As with activities, lecture style information provision was also timed to occur immediately preceding related project development stages. Practical information resources such as templates were provided to students as needed. Project structure
information that supported an overall understanding of how the project should proceed, such as headers for reports and lists of products, were provided at the beginning of the project to provide structure for project work.

Knowledge resources in the form of documents or ‘how to’ guides were generally made available from the beginning of the project on the unit website or in the briefing documents. For example, in C1, students were provided with suggested report headings and list of required outcomes at the beginning of the project. Lectures progressed through project and team management issues at the beginning of projects, to feasibility and costing methods in the weeks before cost calculations were to be completed. Toward the end of the project, presentation skills were discussed in lectures and in class sessions.

**Disclosure**

The project process is often described as a social one, requiring students to show their work to others in order to gather feedback and to develop skills in the negotiation of meaning (Barron, et al., 1998). In each project case there was at least one point at which students were expected to present their work in progress to either the teacher or their peers. This is quite different from the level of disclosure experienced by students involved in other models of education. For example, where lectures and final examinations are the primary means of development, it is possible for the teachers to only see outcomes at the conclusion of the study period, and for students to work entirely in isolation from each other. In A1, exposure to the teacher occurred in every session, while three pin up and presentation sessions required students to present to the whole group. In C1 and C2, similarly, students were expected to disclose their work in progress in activities and practice presentations, and to work through problems with the group. In B2 and B3, students engaged in peer review processes that were somewhat more anonymous, but still required disclosure of unfinished work for critique.

**Teacher responsiveness**

In all cases, the teachers set the problem and subject of the project. They also provided guidelines regarding the methods. Teachers also directed the schedule of activity and timeframes for delivery. However, during classes, teachers took on several roles, including directing activity, providing general guidance, presenting
knowledge, modelling thinking behaviours, coaching and acting as ‘expert’ practitioner in giving feedback. In all cases, the teachers controlled the project and set activities. They also acted as experts, providing a degree of didactic knowledge but more commonly providing guidance and critique regarding project processes and progress, either to groups or individuals. With the exception of planned lectures, these behaviours were not carried out in a strict pattern. In all cases, the teacher also acted as proxy for one or more of the audiences or user groups to whom designs were oriented. In the absence of others, and in addition to their role as teacher, they often took the combined positions of expert, manager, peer, client and user. The variation in roles appeared to coincide with both the kinds of activity occurring in particular project stages and perceptions of student need. In all cases, teachers altered their roles many times during a single class session.

The teachers also responded to perceived student needs by adding or changing the structure of classes and information. In every case the schedule for some sessions was altered in response to student questions or teacher perceptions of student needs. Along with the shifting roles, the degree of adjustments made was indicative that teachers were highly responsive. Although, as noted in Chapter 5, responses were not necessarily appropriate to student needs at all points, there were clear attempts to resolve learning problems by making alterations to teaching plans.

**Student responsibility**

As will be shown in Chapter 7, the degree of student independence in projects was variable. Nonetheless student responsibility, in the form of independence and self-regulation, was an integral part of the project process. This enabled students to practise decision-making in a simulation of professional design processes, and to gain confidence in carrying out problem-solving activities.

Students in all cases were expected to demonstrate that they could not only follow instruction, but also use self-regulatory skills in devising and managing tasks within the project schedules. This was demonstrated by the requirement that most of the work was carried out outside of class time. There were also few formal submission points bearing any assessment weighting, requiring students to self-manage stage completion. This was most marked in the more complex of the projects, where there were significant gaps in instruction, but students were nonetheless expected to achieve the project goals by identifying and carrying out necessary work according to
their own preferences. In the lower level projects, this was still the case, although the greater degree of control by the teacher resulted in limited opportunities to do this. In these cases, the emphasis shifted to managing tasks outside of class time but within the guidelines.

Assessment of application

In all cases, projects concluded with one or more physical product(s) that formed the primary basis of assessment. Students demonstrated understanding of the problem situation and generic, procedural and technical skill largely through the act of production of those physical products, and through the articulation of their outcomes. For example, in A1, students were expected to apply knowledge of building materials and requirements, skills in drawing, visualisation, 2D and 3D design software use, mathematical calculation, and model building. Outcomes were presented in a portfolio format, although in some cases there were also presentations that were either graded or contributed to the assessment of outcomes by providing further evidence of the rationales for decision-making. These skills were therefore not demonstrated through formal exercises or assessed in examination contexts, but were carried out and assessed in application to the project through the culminating products.

Assessment of processes

In all cases, portfolios included evidence of processes and the explicit assessment criteria indicated an emphasis on both the quality of products and the logical progression towards them. Physical products submitted for assessment included developmental work, such as sketches, drafts, workbooks, or research materials. Although process and feedback documentation was not given an assessment weighting or distinct grade, in each case the teacher argued that they provided evidence of problem-solving, responses to intrinsic or extrinsic feedback, the integration of new information, and the use of iterative development and logic. For example, in B3, students were expected to provide a workbook including gathered visual inspiration, feedback documents from peer review activities, draft variations of their symbol designs, and showing evidence of gradual refinement of design. The criteria for assessment included logical development, response to extrinsic feedback and exploration, for which the workbook would provide evidence.
Negotiation of strengths in assessment

There was also evidence that teachers carried out some form of either conscious or unconscious balancing between the perceived creativity of outcomes and the level of risk taken, the conformity with requirements, and technical or procedural skill levels. This negotiation in part represented the capacity of assessors, as supervising teachers, to employ a broader knowledge of students’ processes and learning. Teachers also took input from others as part of the assessment process. The professional panel in A1 provided feedback on student presentations of their products. In C1 and C2, students contributed to grade allocation through a peer review process that could potentially adjust individual grades by up to 10% of the group grade. Nonetheless, in all cases the teacher was able to grade projects with which they had been closely involved and was the primary assessor.

Summary definition

In conclusion, the project cases studied for this thesis were found to involve:

- Highly authentic challenges, replicating the scope of work carried out by professionals and culminating in one or more physical products, but moderated by the educational context

- Bounded but ill-defined problems, with areas of complexity including external and inherent constraints and multiple decision-points and problems to be resolved

- Staged and iterative processes allowing for return to problems, refinement and testing of multiple dimensions

- Application of detailed situational knowledge, procedural knowledge and technical skills that may also be informed by theoretical knowledge

- A requirement for students to employ a variety of generic skills, including time management, communication, negotiation and responding to feedback

- A variety of formal and informal learning activities that are oriented to the completion of project tasks, evaluation of progress and public review
• Responsive and flexible structures allowing for variations in student approach, strengths and weaknesses, and a return to stages where necessary

• Consistent task-oriented contact with teachers and peers, requiring students to engage in disclosure regarding their work in progress, and to negotiate meaning and defend decisions

• Teachers taking on a variety of roles and teaching strategies in line with the needs of the project and of students, including teachers acting as critical guides, coaches and directors, as well as proxy for users, clients or managers

• Sufficient flexibility in processes and content for the integration of students’ previous knowledge, perspectives and personal approaches to problem-solving

• Gaps in instruction allowing for the utilisation and level-appropriate extension of student skills in self-regulation, self-direction, self-evaluation and independent decision-making

• Diverse assessment evidence solely based on the processes, physical products and articulation of the project

• Diverse assessment criteria concerned with creative problem-solving, iterative refinement of technical and aesthetic detail, and the cohesiveness and impact of the end products

• Assessment processes carried out primarily by the supervising teacher, who navigates strengths and weaknesses of each case to make an overall judgment of the achievement of learning outcomes

Conclusions

The projects were highly authentic, being based on the situations, structure, processes and outcomes of professional projects. Commencing with a project brief, students worked through staged processes to develop solutions to often complex and ambiguous problems. They also worked within constraints and with an awareness of an external audience. This supports Penaluna’s (2007) argument that, in design education, students work through ideas in projects and exercises and are taught to ‘to integrate their designs with production and other needs’.
Accordingly, procedural and technical skills were consistently embedded in the project curriculum. There was considerable emphasis on the application of design processes, stages and techniques in all of the projects. The development of procedural, technical and generic skills is a common claim in the literature around design education projects, and in project methods more generally. In both cases, authors argue that students carrying out projects develop a range of skills including technical competency, knowledge and project management, self-regulation and communication as well as learning to gather and integrate feedback from others (Barron, et al., 1998; Helle & Tynjala, 2004; Keskeys, 2000; Lee, 2006; Penaluna, 2007; Smith, et al., 2009). The projects reviewed for this study without exception provided experiences to students that emphasised the development of these skills.

In addition to the overall definition of projects in accord with the literature, the analysis of the common characteristics across the projects raised several thematic questions in relation to design education. The first two of these are concerned with the navigation of authenticity in the educational environment. Subsequent questions relate to the limitations of the knowledge and skill domains, the challenges associated with the articulation of key concepts, the role of the teacher, and assessment.

**Capacity to deliver authenticity**

Authenticity to professional practice is also widely argued as a central feature of design education (Durling & Griffiths, 2000; Keskeys, 2000; Moore, 2007). Several authors argue that the goal in design education is to initiate students into practice by providing learning experiences that mirror professional tasks (Davis, 1998; Gothe, 2000; Schon, 1985; Wormald & McDonagh-Philp, 2000), while others assume that this is the case (Chipps, 2007; Lewis & Bonollo, 2002). Davies (2002) and Davies and Reid (2000) reported that many students also believe initiation into professional practice to be the primary purpose of gaining a design degree, albeit based on a somewhat limited conception of what that practice might be. Such an initiation is enabled by authentic experiences mirroring professional practice.

In the literature on design education there is debate around three concerns with the purpose of design education in relation to professional practice. First, several authors have raised concerns about whether professional competency is a sufficient goal in an undergraduate education (McCoy, 1990; Swanson, 1998; Chipps, 2007; Longden-
Thurgood, Penty, & Roberts, 2007). Other authors have debated whether design education is or should be oriented toward professional practice as it currently exists or for a potential future (Cross, 2001; Friedman, 2000; Lawrie, 2004). Finally, some authors have questioned whether design teachers have sufficient knowledge of current and future paths for design professionals to provide relevant experiences to students (Friedman, 2006; Swanson, 1998). While the first and second of these arguments are rather polemic in nature, the third can be empirically tested through identifying whether teachers have relevant experience, and whether the projects and activities reflect those undertaken by professional designers.

The degree to which teachers have relevant experiences in professional design practice is relatively straightforward to refute in the cases studied. All of the teachers had recent and long-term professional experience. The second part of the question – whether the curriculum reflects professional activity - presents a challenge. Literature related to the overall role of designers is limited (Dorst & Reymen, 2004). The literature does provide information regarding distinct aspects of design cognition or parts of design processes, such as the nature of design problems (e.g. Buchanan, 1992; Casakin, 2002; Coyne, 2005; Rittel & Webber, 1973) and of design problem-solving (e.g. Dorst, 2004; Eisentraut, 1999; Goker, 1997). The data in this doctoral study showed that teachers employed the types of projects, tasks, and problem-solving processes employed by practising designers. The problems were situated and realistic and involved constraints, stages and iterations of development, culminating in variety of physical products of a nature similar to those produced by working studio designers. Teachers modelled problem-solving processes described by Cross (2006) as being used by professionals, such as mutation, analogy and reconfiguration of concepts. These activities varied in depth and complexity depending on the level of the project but in each case related directly to varying scales of professional design projects.

In combination with the evidence that the project tasks involved processes reflecting design work as described in the literature, it can be concluded that the teachers were able to identify types of projects and activities that reflected contemporary practice. Friedman’s (2006) concern with current experience was therefore not borne out in the data. Nonetheless, it is acknowledged that current professional experience does not necessarily reflect knowledge of future patterns. The concerns in the literature regarding the goals of design education therefore remain unanswered.
**Authenticity in the educational context**

The links with professional authenticity in the projects also demonstrated some aspects of the literature on project methods. Specifically, authors argue that the importance of problems and constraints as the driving force behind student learning. Related to these is the requirement for students to engage with problem-solving and complexity. As noted in the introduction to this thesis, Mergendoller et al (2006) argue that the problems in project methods are most effective when they are ill-defined. Ill-structured or ill-defined problems change over time, mutating ‘as students address them. What was a minor issue becomes major. Conditions and constraints change. New, unexpected problems arise. These dynamic and changing problems are generally more difficult to solve than static ones’ (Mergendoller, et al., 2006, p. 591). A number of authors further argue that such problems can create the conditions under which deep, analytical and meaningful learning occurs (Blumenfeld, et al., 1991; Gull, 1933; Helle, et al., 2006; Mergendoller, et al., 2006; Schon, 1987).

Each of the project cases complied with these definitions – at least some aspects of each project were poorly defined, they possessed multiple criteria for evaluation, and they required students to make judgements about the problem and to select from several potential solution paths and solutions while working within and negotiating a variety of constraints. They also engaged in peer review and articulation activities that reinforced the negotiation of meaning and supported benchmarking of their progress with peers. It can be concluded that the authenticity of projects directly reflects the basic conditions required for meaningful learning.

There are, however, limitations to the complexity of problems and constraints in the educational context. There is little in the literature to identify the range of constraints on authenticity in the educational context. McCoy (2000, p. 272) does note the differentiation between timeframes, and the impact of this on the scope of projects in design education: ‘there must be some limit to the complexity of a project appropriate for undergraduate design studio. Limits may be necessary not because the students cannot handle complex problems, but because of time constraints’. There are also necessary limitations to the degree to which projects can replicate professional work. As Gothe (2000, p. 211) argues:

> These learning experiences are typically situated in imagined contexts with outcomes that are determined by particular approaches and aesthetic codes
established by individual lecturers and the culture of the institution rather than the multifarious and complex weave of interactions that impinge, form and contribute to a designing process in the world of practice. In the realm of professional practice delivery, reputation, time, technology and relations create permutations that are more diverse than can be achieved in a lecturer-student interaction’

Processes were somewhat moderated by the educational context in which they were being carried out, for instance, the semester schedule of classes, concurrent workload, the presence of instruction and formal assessment requirements. Purposeful adjustments are also made to projects to accommodate the educational context. Teachers managed the complexity of problems along with their expectations of the quality and complexity of design solutions by providing structure, support and feedback in the form of activities, resources and scheduled stages, moderating the degree to which students were required to demonstrate the knowledge, self-regulation and autonomous decision-making expected of professionals. Teachers, therefore, also controlled aspects of the process to make it manageable and to focus on the learning curve students were experiencing.

Limitations of the knowledge and skill domains

Findings showed that the projects were focused on the development of situational and procedural knowledge, and technical and generic skills. While this provided students with opportunities for inquiry related to the problem situations of each project, there was far less evidence of the articulation or application of theoretical knowledge. These emphases are reflected in the literature on design education. In particular, Penaluna (2007) argues that students in design education are not generally provided with a theoretical or instructive background prior to carrying out their projects. Clews (2003) further argues that project methods in design necessarily involve an emphasis on situational knowledge. Smith et al (2009, p. 14) argue that the aims of design education are to provide students with opportunities to learn how to design, and to gain ‘knowledge about concepts and/or situations through the act of designing’. Keskeys (2000, p. 240) agrees, arguing that the design process itself provides students with analytical skills, and that ‘design disciplines are widely recognised as requiring a high degree of problem-solving ability and creativity. These inherent demands of the subjects provide for a solid foundation of ‘thinking skills”.

In contrast, over recent years there has been increasing debate regarding whether learning by ‘doing design’ is sufficient for the university environment, and a concern with what has been perceived as ‘anti-intellectualism’ in design education (Blauvelt, 1997; Durling & Griffiths, 2000). Several authors have argued that an increase in theoretical underpinning is needed in design. For example, Frascara (2007) argues that design education should be the vehicle through which students gain understanding of how and why design operates as it does. He argues that the focus on the design artefacts, or production of artefacts, is insufficient. The aim, he further argues, is to deal with the problems of design such as understanding the human and cultural factors of design, understanding how and why design outcomes operate as they do and their impact on the relations between people, things and environments, as well as developing the methods, planning and visualisation skills of professional designers.

These arguments point to the limitations of the design curriculum as found in this study. Namely, the lack of explicit theoretical underpinning in the syllabus, linked to the experiential and highly situated nature of design projects and the lack of broader development around the relationship of design to the broader environment. Rather, there was a focus on problem-solving within each problem context, thereby narrowing the syllabus to the hypothetical consideration of the impact of a particular design on the given situation and the user. This is further linked to the authentic nature of project curriculum, and the desire to provide students with a professionally authentic experience. The lack of theoretical base for these activities may well be problematic if the aim of the process is to develop theoretical understandings and to test those understandings in practice. The aforementioned aims are not necessarily reflective of the aims of professional projects, causing a tension described by Schon (1987, p. 8) as ‘a variation of the rigor-or-relevance dilemma’.

Whether or not the syllabus includes theoretical content, it is not clear that this is detrimental to student learning per se. Although Friedman (2000) argues that a broader theoretical and critical analysis is required to transform experience into knowledge, and to engender graduate independence, the project curriculum in this doctoral study demonstrated structured inclusion of expectations that students would engage in critical inquiry, analysis and independent thinking. Specifically, the projects involved critical inquiry regarding the project situation, analysis of the quality of solutions and the degree to which they meet the problem and user needs within given constraints. The projects were also structured around expectations that students
would be required to engage with and manage interrelated tasks and concepts, use independent decision-making and to resolve issues arising from those decisions. The data, therefore, supported Keskeys' (2000) and Smith et al's (2009) assertions that thinking skills are embedded in the design curriculum.

This is not to say that in all cases the use of analytical processes, the nature of problem-solving, or the evaluation of these skills were well articulated. As will be argued in the next section, significant gaps were found in the way that teachers identified aspects of the intended learning outcomes.

Articulation of key concepts

The findings in the analysis of congruence, variations and commonalities showed that there were several gaps in the articulation of key concepts around design quality. Specifically, these were related to expectations around the aesthetic and creative qualities of student work and their inconsistent and often superficial articulation, and the disparity in their emphasis between project processes and assessment. Notions of creativity or innovation were commonly embedded in the learning outcomes and assessment criteria, or implicit in discussions with students. While some of the scaffolding activities and resources were clearly related to the process of creative problem-solving, none explicitly referred to these concepts. Further, teachers did not, and in interviews were unable to, define what would constitute creative or innovative outcomes.

The lack of capacity to articulate what are considered important aspects of design quality has been widely argued to be a serious issue in the quality of design education (Blair, 2006a, 2006b; Frascara, 2007; Percy, 2003; Webster, 2006). Authors have claimed that the unspecific nature of the requirement, along with teachers’ implicit preference for personally appealing aesthetics means that it is possible for students to avoid engaging in any development work, or indeed, any learning. It is further argued that students who have strong visual or imaginative rendering skills are able to present outcomes of high design quality without engaging in any depth of learning (Davies, 1996; Frascara, 2007). Similarly, there have been criticisms of the lack of clear articulation of criteria and an over-reliance on a ‘wow factor’ in design education. It is argued that the lack of focus on learning in design assessment leads to a high degree of imitation (Frascara, 2007) and strategic behaviour (Davies, 1996) by students. This certainly appeared to be a consistent
issue in one of the projects reviewed for the study, and was present in some form, either in discussion or in assessment criteria, in the others.

The contrary argument in the literature states that creativity cannot be taught – ‘at best it can be identified, encouraged and supported’ (Goldschmidt, 2003, p. 3). Edwards (1995, p. 2) argues that ‘we still have no accepted definition of creativity – no general agreement on which it is, how to learn it, how to teach it, or if, indeed it can be learned or taught’. Others argue that creativity cannot and should not be explained (Neil & Forde, 2007). These authors agree that teachers are able to recognise design quality, if not to articulate what constitutes an aesthetically resolved or creative product. This in itself is problematic. As Til (2004), Percy (2003) and Blair (2006a, 2006b) have noted, the lack of capacity to articulate these key concepts during discussions about progress can leave students confused and unable to use feedback to develop their work further, or to understand the basis on which assessment decisions are made.

Although creative skills and expectations of aesthetic quality in the outcomes were embedded in the curriculum, students were not provided guidance regarding the nature of the expectations held by teachers. Explanations of the expectation and processes were largely implicit, with teachers either modelling the creative problem-solving process or showing examples that they perceived as aesthetic or creative exemplars. This contrasted sharply with the clear articulation of the expectations around procedural, technical and generic skills. The argument that design teachers do not readily articulate concepts around creativity and aesthetic quality were therefore well supported by this study. The findings presented in Chapter 5 further showed that congruence was negatively affected by the variable emphasis on these aspects of design across the curriculum.

The role of the teacher

Helle et al (2006, p. 293) describe the role of the teacher in project methods as that of ‘an expert practitioner, a model and a coach’. Adderley et al (1975) describe the role as one of supervisor, but concerned with providing guidance rather than direction. The data in this study clearly indicate that teachers take on a variety of roles in relation to the project and to students, dependent on their perceptions of student needs and of their own role in the educative process. The stance taken is highly complex and prone to change dependent on the degree of responsiveness of
the teacher and at points in the project process such as the need to simulate a client presentation event. Rather than taking on the fixed role of ‘guide’, teachers in the project cases took on a wide range of strategies and roles throughout the project duration. They acted as directors, critical guides, coaches, and instructors. They further took on proxy roles as experts, managers, users, clients and colleagues. Teachers also demonstrated a high degree of responsiveness and flexibility in shifting roles and strategies, often many times within a single class session. These changes in approach were linked to project stages and activities and teacher perceptions of student need. As demonstrated in Chapter 5 on Congruence, the degree of responsiveness to the project and student need was an indicator of successful curriculum.

Teachers were also engaged in close contact with students. This constancy of contact, and the preference for disclosure of work in progress through critical review and pin up sessions raises some issues in the literature. A number of authors have identified problems with models, based on studio practice, in which students await teacher comment on work in progress. Swann (1986) questioned whether students’ learning is improved using this model. In particular, he argues that the use of such a model serves the teacher more than the student. Davies (2002, p. 168) argues that the model has traditionally been transmissive in nature, with teachers ‘transferring what they knew about design to students’. Ashton (1997) also comments that teachers tend to dominate discussion in the studio. Green and Bonollo (2003) argue that students can become overly dependent on teachers in the studio. They further contest that the ‘outcomes can be disappointing where many students depend on lecturing staff for the generation of ideas and the resolution of those ideas’ (p. 272). Hedley et al (2007, p. 8) concur that the studio environment ‘allows the lecturer to develop control and often power based relationships with the students’, and that there is ‘a risk in this relationship of co-dependency where the student depends on the lecturer for knowledge while the lecturer enjoys contributing directly to the work and the student’s learning’. As noted in Chapter 5, it is possible for the use of individualised and constant disclosure processes to have a negative effect on student learning where the teacher and students’ roles are misaligned. Overly directive or punitive, or insufficiently supportive, roles in relation to the needs of students and the project creative ‘destructive friction’, hindering student progress.
Assessment

Finally, assessment, as with scaffolding, was integrative. Several authors comment on the complexity of the task of setting assessment for project methods (Adderley, et al., 1975; Helle, et al., 2006; Mergendoller, et al., 2006; Thomas, 2000). However, it is widely agreed that the assessment of the whole project is not only preferred, but also best reflects alignment with the aims of project methods. That is, an integrated assessment of the project processes and products centres assessment on student learning activity. By assessing the learning processes and the direct products of those processes and engaging students in both the formulation of criteria and self-evaluation, rather than creating additional assessment tasks that require abstraction of the knowledge or skills gained, students are able to immerse themselves in the learning itself (Barron, et al., 1998; Helle, et al., 2006). It is further argued that by allowing students to present a range of evidence regarding their learning and the products of that learning, scope is provided to assess students on their individual strengths and weaknesses, and to acknowledge learning achievement even where it comes at the cost of a poorer product (Armacost & Lowe, 2003; Gulbahar & Tinmaz, 2006). As shown in Chapter 5 on Congruence and above, these aspects of the project process were common to all of the projects studied.

The process of assessment was further directly linked to the concern with authenticity, with teachers demonstrating emphasis on professional levels of outcome. In all cases, regardless of the level of written or formal calculations for grades, teachers carried out the assessment. They also exhibited grading processes involving negotiation between the strengths and weaknesses of each case, rather than strict adherence to numeric calculation, to reach a final judgement. This presents both a benefit and a challenge. While the degree of teacher control of assessment, and the latitude in negotiation of grades allowed teachers to assess learning as well as the quality of the outcomes, there was a tendency, as shown in Chapter 5, for teachers to reference poorly defined qualities as part of the criteria. In one case, there was a clear tendency to privilege aesthetic qualities over other aspects of the work.

This reflects some of the most consistent criticisms found in the literature regarding the assessment of design work. It is widely argued that innovation and creativity are rewarded more highly than the completion of assessment requirements in design education (Blair, 2006b; Davies, 1996). It is further argued that these terms are
difficult to define and that design students, in particular, have difficulty in identifying their progress against such criteria (Blair, 2006b). This is demonstrated in the dominance of the ‘yawn or wow’ factor described by Stables and Kimbell (2006), and by Goldschmidt’s (2003) and Blair’s (2006b) findings regarding the emphasis on originality to the exclusion of the espoused technical criteria in critical reviews and design juries.

Davies (1996) argues that emphasis on innovative products does not necessarily provide evidence of student learning. In support of this argument he presents an example of two students with qualitatively differing artefacts and the implications of this for assessment. In the example given, one student presents an artefact of high quality, but that also looks like previous projects and doesn’t closely answer the brief. Another student presents an artefact of poorer quality, unfinished, but has gained deep insights and is able to identify weaknesses in the work. The former, where the product is the criteria for success, would achieve higher marks, despite the student appearing to have learnt little other than a formula for satisfying the aesthetic requirements of the teacher. Davies questions whether this model provides students with any learning experience that is relevant to the professional world. He argues that students, where products are privileged, are more likely to take a strategic and, therefore, more superficial approach to learning.

The precise nature of criteria for assessment in tertiary level design education is unclear. In the available case studies, there appears to be a shift toward the inclusion of more explicit learning outcomes related to the design process (Ehmann, 2005). These include the gathering of contextual information, the exploration of multiple solutions, use of technology, teamwork, verbal and written presentation skills and orderly project management. Unsurprisingly, given the scarcity of detailed case studies, there is little data from which to draw conclusions about common practice. The field would benefit from a great deal more discussion about the criteria for assessment and how the work of design students is assessed.

Chapter summary

In this chapter, the common characteristics of projects in the design education context have been reviewed. It was established that the characteristics of the project cases aligned reasonably closely with the existing definitions of project methods.
Project methods, as defined by Adderley et al (1975) and Helle et al (2006), can be summarised as involving the solution of a contextualised problem, student initiative and control, a variety of educational activities, and a concrete artefact as the end product of student activity. In the early part of this chapter, it was argued that these existing definitions of project methods capture most, but not all, of the characteristics of the project cases studied for this thesis. In addition, two aspects of the Adderley et al definition were identified as being mismatched with the data: the length of time allocated to projects, and the role of the teacher as guide rather than authority.

The descriptions provided in the literature did not precisely capture all of the common features of the project cases. Findings showed that the project cases did, indeed, involve the production of a concrete artefact in response to contextualised problems. These problems can perhaps more aptly be described as situated problems because they were not only given context, but because the problem-solving process also relied heavily on student understanding of the situation in which they resided. Students also had some degree of control and were required to take initiative in some aspects of the process. The curriculum, and the projects themselves, were organised around a variety of educational activities.

It was also noted that in the description provided by Adderley et al, there was ambiguity in relation to the time and scope of projects. In addition, teacher roles in the projects, as shown in Chapter 5, did not reflect their definition of teachers solely as guides. Rather, teachers were responsive took a variety of approaches to interaction with the project and with students, indicating a degree of responsive behaviour. Three additional broad areas of commonality in the curriculum itself were noted. In addition to the basic requirements for problems, culminating physical products, student initiative and a variety of activities, projects were oriented toward professional authenticity, an emphasis on particular kinds of knowledge application, and high levels of integration in the curriculum.

In this chapter, specific challenges in the delivery of project curriculum were also raised. These issues related to the capacity of teachers to deliver authenticity and the moderations of authenticity related to the educational context, limitations of the knowledge and skill domains, articulation of key concepts around creativity and aesthetics, weaknesses of the highly individualised structures in relation to teacher behaviours, and the complexity of project assessment. In conclusion, a summary
definition of project methods in the design education context, and as found in this study, was presented.
Chapter 7:
Analysis of variation across cases

Across the project cases reviewed there were clear differences in the scope, degree of complexity, level of independence and scaffolding provided. However, no literature was identified that compares project types in design education. As noted in the introduction to this thesis, writers tend to assume that the project curriculum has a single form and consequently homogenous structure and learning outcomes. While Blair (2006b) notes the potential for wide variation in project topics, case studies on design education projects rarely provide sufficient detail about the projects to make comparisons. The literature on project methods is more fruitful. Under the broad umbrella of project methods, several authors have categorised projects into types. In this chapter, these typological comparisons between projects are reviewed for their applicability to the cases reviewed for this study. The cases are then compared for their key differentiating characteristics.

Project types in the literature

As noted above, the literature on project methods provides several examples of differentiations between project types. Distinctions have been made according to various combinations of characteristics, including their scale and degree of control, place in the curriculum, and their focus or learning aims. Four descriptions of project variations were found in the literature that may be compared with the project cases in this study.

Morgan (1983) suggests that projects can be categorised according to their internal structure, content and learning aims. Based on this concept, he defines three idealised categories of projects: the project exercise, the project component, and project orientation. In project exercises, the student acquires knowledge and skills elsewhere in a program and follows discipline paradigms to apply their prior learning within a project. Project components also occur alongside other studies but tend to be interdisciplinary, open-ended and of personal interest to the student. Project orientation covers instances where projects are the sole curriculum method for a program or institution. Morgan argues that the project orientation of entire programs
disrupts traditional subject-based program structures and thus allows for interdisciplinary project experiences.

Morgan’s definition of project exercises bears some similarity to the projects reviewed for this study. In particular, that they are used to apply knowledge and skills within the discipline paradigm. This category assumes that knowledge and skills are learnt elsewhere and applied in one synthesising project. In the context of the programs studied, projects were the sole organising feature. Morgan’s definition of project components has similar limitations, implying that students have only one opportunity to carry out a project. In this category, student interests drive projects and they are not organised according to subject areas, nor are topics provided. In all of the projects reviewed for this study, students were expected to work within predefined topic areas and carry out specific tasks. Consequently, this category also does not capture the character of the project cases studied. Morgan’s definition of project-orientation includes projects as the sole curriculum method across a program. This would therefore appear to capture the projects studied. However, in the definition of project orientation, Morgan argues that projects are not organised in units of study but are based on integrated programs involving students in exploratory and interdisciplinary work. The projects studied did not conform to this requirement, with all being organised into units of study and with only C1 and C2 involving interdisciplinary work. Collectively, therefore, Morgan’s categories do not provide an appropriate conceptual framework for describing the variations in the projects reviewed for this study.

Adderley et al (1975) describe three types of project arranged in a hierarchy of autonomy and complexity. The first is a project in which students select their project topic and scope and manage their own work over a considerable period of time. They argue that this type of project involves highly authentic experiences, requiring students to deal with considerable complexity, self-direction and personal responsibility. The second type of project identified by Adderley et al is one in which the topic is pre-defined. They refer to this as a ‘set project’ (p. 28). In this type of project, the aim is to synthesise or organise existing knowledge from one or more subjects; or to extend competency in a particular area. The third type of projects described by Adderley et al is the mini-project. They describe this as a project of 6-12 hours duration, and consider the scope appropriate to the early years of higher education, suggesting that larger scale projects are best reserved for the later years. The aims of such projects, as outlined by Adderley et al (p. 23), are:
• Awakening interest
• Gaining familiarity with equipment, devices or materials
• Developing some of the skills of major projects

The first category of projects suggested by Adderley et al reflects some aspects of some of the projects reviewed for this study. Particularly in the case of A1 where students deal with high levels of complexity and are expected to demonstrate self-direction across all aspects of the project. Similarly in C1, students were generally self-directed and able to determine the topic of their projects. However, the scope of both A1 and C1 was preselected. In A1, the topic of each project was also predefined. These projects therefore did not precisely meet this definition. Excluding the requirement of synthesis, the set project category would provide a reasonable overarching definition of the projects studied. Each of the projects involved a pre-defined topic and extension of previous competencies. In this study, therefore, the set project category does not provide the basis for differentiation between the projects. The mini-project category reflects evidence identified for B1. That is, a project of short duration, structured as a series of small steps, and designed to build student capability in a narrow area. The narrowness of the scope of this kind of project also reflects the scope of projects B2 and B3, but these projects were of longer duration and showed evidence of more complexity than suggested by the short time frame given for mini-projects. Adderley et al’s categories therefore also do not sufficiently describe the variations in the projects reviewed for this study.

Gjengedal (2000) draws on similar concepts to those found in Adderley et al’s categories, presenting three roughly sketched categories of projects in a hierarchy of autonomy and complexity. These are presented in the reverse order to those suggested by Adderley et al (1975). The first of these categories is a project in which students develop project skills such as teamwork and project management. The projects are short and introductory in nature, and therefore are similar to those suggested by Adderley et al as mini-projects. Gjengedal argues that the development of generic skills in project management is the primary rationale for these projects, rather than any content mastery. In this respect, Gjengedal’s definition is narrower than the one provided by Adderley et al. The second category suggested by Gjengedal is the ‘course-based’ project. In this category, content demands are added to the skills and knowledge gathered in the first projects. The third category is
comprised of projects for, or with, industry. In these projects students address real world challenges and contexts.

The first of Gjengedal's categories reflects some aspects of C1 and B1. In particular, the emphasis on development of generic skills related to project management was similar to that found in C1 and the scale of the project was similar to that found in B1. However, the scope of those projects, according to Gjengedal, is limited to preparation for content-based projects. While in B1 the scope was similar and the aim was introductory, the project did not provide an introduction to project management. Equally, the content focus of C1, and the level of complexity, did not conform to the suggested introductory level of this category. The second of Gjengedal's categories broadly captures the tone of all of the projects reviewed for the study. That is, that they included intended learning outcomes that covered both project topics and processes. Like Adderley et al’s set projects and Morgan’s project components, the assumption is made that learning occurs elsewhere and is only applied in the project work. Gjengedal’s category thereby implies that the projects are an act of synthesis of previous learning.

As previously noted, projects were the sole organising feature of the units and programs reviewed. Although in five of the project cases there were also lectures, these were oriented to supporting the project, and therefore did not meet the category requirement of application of prior learning. In the third category, the degree of complexity in the projects is captured by their relationship with industry. While to some degree, all of the projects reviewed for this study excepting B1 involved challenges related to the function of design professionals, none of them were specifically for industry. Thus, Gjengedal’s categories do not provide sufficient detail or conceptual breadth to explain the variations in the projects reviewed for this study, and are, therefore, insufficient explanations.

Kolmos (1996) also briefly describes three different types of project organised in a hierarchy of autonomy and complexity. The first is defined as an ‘assignment project’. This type of project is characterised by high levels of control by the teacher, who selects the problem, subject and methods. The second type is referred to as a ‘subject project’. In this type, teachers select the subject of the project, but students select the problem and methods. The third type is the ‘problem project’. In this project type, teachers identify a framework. Students select a problem within this framework,
which then provides the basis for decisions about the subject or subjects and methods that will be used.

In the projects reviewed, there were varying levels of explicit control of projects suggested by the degree of complexity of the problem, level of scaffolding, and scope for students to carry out independent decision-making. For example, B1, B2 and B3 fit well within the 'assignment project' category. Each had clear controls placed on the problems to be addressed and the methods to be used in completing the work. A1 could also be allocated to the category of 'problem project', as students were provided with the problem situation and required to carry out all learning activities and tasks independently, utilising feedback through individual consultations. Conversely, it could also be argued that A1 was a 'subject project', in that students were provided the subject of study (a library on a given site). It could also be argued that the expectation that students carried out particular processes and methods, such as a light study, place it in the 'assignment project' category. Similarly, there is some difficulty in allocating C1 and C2 to a category. While they display some areas of teacher control, these vary considerably across aspects of the project. In both of these cases, the subject or problem situation was predefined, suggesting that they conform to the 'subject project' category. Nevertheless, there were aspects of teacher control such as in C2, the provision of interview protocols, which would more appropriately place them in the 'assignment project' category. Thus, although Kolmos’ categories are more consistently applicable to the projects studied than any of the previously described frameworks, they are not sufficiently well defined to identify the project types in this study.

In the definitions of project types described above, there is a general theme related to the scope and locus of control in a project. The general focus of Kolmos’ categories is also suggestive of a framework that might be applied to the projects reviewed. That is, students are provided varying degrees of control over their project work. In Chapter 5, the scope, degree of complexity and locus of control were the defining factors in understanding the internal congruence of variables within each project. In particular, the scope and complexity of projects in relation to expected student capacity were key characteristics for identifying articulation, and the explicit locus of control was a defining criterion used in the identification of dispositional consonance. Consequently, I am using these as the organising concepts to identify project types. The scope of projects is defined in this thesis by the number of its parts and their
internal complexity. The locus of control is defined in relation to the level of independence required of students in determining and completing project tasks.

Taking into account the issues of congruence noted in the previous chapter, the projects can be differentiated using these criteria as the primary organising mechanism. In the following section, the projects are compared, with a particular focus on the defining features that differentiate each project type. Bearing in mind the need for empirically grounded definitions, where incongruence with a strong impact on the consistency or outcomes of the projects was noted in the previous chapter, judgements are made regarding the changes that might improve congruence. This leads to a largely empirical, but also idealised, typology of projects in the design education context.

**Comparison between projects**

Using the curriculum model structure, each project was reviewed for variation. Data were tabulated and compared where significant variation was identified. These tables are provided as Appendix C. In this section, the narrative comparisons are provided, along with summary tables showing the key conceptual differences between different projects. In the following section, the project types are characterised.

**Project scope**

The scope of projects varied considerably in the number of complex parts and the degree to which problems were defined. Where multiple parts were identified in projects, the complexity of parts could be defined as the complexity of relationships between those parts, as well as the number and complexity of the concepts that needed to be incorporated in each. The level of problem definition provided to students in the project brief also indicated the degree to which problem definition was the responsibility of students. An additional layer of complexity was identified in the degree of familiarity the students had with the audience or user group, and the degree to which students were expected to integrate user or audience needs into their projects. The combination of these features formed the degree of complexity and project scope. The variations noted in analysis were multi-part, and are shown below in Table 2:
In A1, there were multiple complex parts which required a high degree of integration, and for which the problem was poorly defined. There were also multiple unknown audiences and users to be taken into account, necessitating additional inquiry and integration of user needs with the theoretical, practical and aesthetic approach taken. Although in C1 there were significantly fewer complex parts, the problem was also poorly defined and there were multiple considerations and two disparate unknown audiences requiring integration of some conflicting priorities. However, the degree of concern with the audience or user group was not as significant as in A1. C2 was composed of a defined problem, with several connected parts, but with only linear integration and comparison between theory and data required. The audience in this case was also limited to the organisation of choice and was not a primary concern other than requiring a clear elaboration of the brand strategy. In B2, there was again less complexity. The problems in this project were well defined and limited to
connections between production requirements, textual requirements, and visual themes. In addition, the audience was pre-defined and familiar. In B3, the problem set was narrow and well defined, requiring only visual problem-solving in relation to a general audience. B1 was extremely limited in scope with minimal complexity. Comprised of only one part, this project involved clearly defined linear steps, and no audience considerations other than abstract expressive considerations. These variations are summarised in Table 3 below:

<table>
<thead>
<tr>
<th>A1</th>
<th>C1</th>
<th>C2</th>
<th>B2</th>
<th>B3</th>
<th>B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple complex parts</td>
<td>Complete integration of all parts</td>
<td>Context and some aspects of the problem defined Unfamiliar users and audiences</td>
<td>Several interrelated parts</td>
<td>Some integration of parts</td>
<td>Context and some aspects of the problem defined Unfamiliar audience</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Small number of parts</td>
<td>Linear integration of parts</td>
<td>Most problems and some solutions defined Familiar audience</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Small number of parts</td>
<td>Thematic integration of parts</td>
<td>Most problems and some solutions defined Familiar audience</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>One part in some variation</td>
<td>Linear development</td>
<td>Problems and most aspects of solutions defined General audience</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>One part</td>
<td>Linear steps</td>
<td>Problems and most aspects of solutions defined No audience</td>
</tr>
</tbody>
</table>

*Table 3: Scale and complexity by project type*

**Time allocations**

In each case the amount of time allocated to the project varied considerably. Time allocated was identified by both the number of class sessions dedicated to the projects and the number of weeks available for students to complete the projects. Time dedicated to final presentations (where these were included) was not counted as class contact time for the purposes of this study. Although students might receive feedback during these presentations, this time was associated with assessment rather than project development. The week leading up to submission of final products was included in the time allocation for project completion. The proportion of unit grade allocated to the projects in most cases reflected the time allocation as shown in Table 4 below:
In A1, the project was scheduled over 12 weeks of class contact and allocated 100% of the unit grade. Presentations were scheduled two weeks after semester end, at which time students also submitted their portfolios. This gave a total of 14 weeks for project completion. Notably, this project was also allocated double the contact time of the other projects. This has only partially been taken into account in the calculations.

In the literature on accelerated learning, support can be found for differentiating between the amount of time allocated to an activity and the length of time allocated to an activity (Lee & Horsfall, 2010). While it was possible to record the amount of time allocated to in-class activities, the amount of time allocated to an entire project is difficult to empirically justify. It is unclear whether time is used between classes, and if so, whether it is used effectively. There was also less differentiation between the projects in relation to the amount of time available. Specifically, A1 was the only project that differed by the allocation of twice the credit points of the other projects, and a reduction in concurrent units of study being undertaken. The length of time available to students was more clearly differentiated. Each of the projects showed variation in overall timeframe, ranging from a few weeks to a full semester of delivery. The latter of the two concepts has, therefore, been applied to provide the minimum time allocation for the project.

The time and weighting of the projects generally reflected the level of autonomy and complexity in each, with the exception of B2 and C2, which were reversed. The relative scale of the projects within the units explain this. In Unit B, B2 was a significantly larger project than either B1 or B3. In Unit C, C2 was the secondary project, with the bulk of the work being allocated to C1. In the analysis of C2 in the previous chapter, it was also noted that there was insufficient time to provide scaffolding and depth in the project and as a result the quality of the outcomes was poor. Working from the overall project complexity and scope, C2 would more logically be allocated a longer period of time for development. A revised table taking account of the need for extension in C2 would thus show a comparable scale for C2 and B2. While the revised and idealised projection of time frames is shown in Table 5 below:
Table 5: Revised time allocations by case

<table>
<thead>
<tr>
<th>A1</th>
<th>C1</th>
<th>C2</th>
<th>B2</th>
<th>B3</th>
<th>B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-14 +</td>
<td>7-9 weeks</td>
<td>5-7 weeks</td>
<td>5-7 weeks</td>
<td>3-5 weeks</td>
<td>2-3 weeks</td>
</tr>
<tr>
<td>weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Intended learning outcomes

In the intended learning outcomes, a clear variation across projects in levels of decision-making and compliance was identified. Equally, skill and knowledge domains varied in their emphasis, type, level and context of use. The summaries of these variations in the data are shown in tables 6 and 7 below:

Table 6: Summary capabilities data variations by case

<table>
<thead>
<tr>
<th>A1</th>
<th>C1</th>
<th>C2</th>
<th>B2</th>
<th>B3</th>
<th>B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomous decision</td>
<td>All</td>
<td>Most</td>
<td>Some – selection of data</td>
<td>Minimal – refine images</td>
<td>Minimal – select images</td>
</tr>
<tr>
<td>making</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compliance</th>
<th>Minimal explicit</th>
<th>Technical aspects</th>
<th>Procedural aspects</th>
<th>Most aspects</th>
<th>All aspects</th>
<th>All aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Additional skill     | Multiple technical | Communications project management | Conceptualisation | Communications project management | Project planning | Data collection | Self-management | Visual design | Visual problem-solving | Following instruction | Following instruction |
| types by theme       |                  |                                      |               |                                      |                   |               |                        |              |                          |                        |                          |

<table>
<thead>
<tr>
<th>Skill levels</th>
<th>High</th>
<th>Medium</th>
<th>Medium</th>
<th>Basic</th>
<th>Basic</th>
<th>Basic</th>
</tr>
</thead>
</table>

Table 6: Summary capabilities data variations by case
At one end of the spectrum, A1 centred on consistently autonomous decision-making. Students were expected to make decisions about potential solutions as problems arose, and to critically acquire and integrate situational, theoretical, technical and procedural knowledge to some depth. They were further expected to argue for their positions based on this knowledge. In contrast to A1, in C1 independent decision-making was limited by the guidelines for proposals, and knowledge acquisition through inquiry was limited to situational knowledge. Nonetheless, intended learning outcomes in C1 also included the development of integrative skills, meaning that situational, theoretical, technical and procedural knowledge were represented in the final product rather than being tested separately. The project in C2 was at a slightly lower level, and centred on the development of general process and analytic skills, including some level of independent decision-making, effective use of provided materials, and acquisition of a limited range of situational knowledge. As noted in the previous chapter, ideally, students would also be expected to make a comparison between their situational knowledge and a provided theoretical knowledge base. In B2, there was a lower expectation regarding the areas in which students would carry out decision making independently. This project was centred on the development of basic design process and technical skills, and the use of easily available situational (designer) knowledge, with students expected to make basic decisions regarding conceptual and visual direction, but more importantly to demonstrate the competent use of procedural knowledge and
processes. The project in B3 also included an expectation that students would make some decisions about their visual work, but was centred on the development of basic process skills, requiring students to follow instruction, to work within rules, to use the provided materials effectively, and to utilise one type of procedural knowledge in the production of a visual solution. The B1 project, with the lowest degree of independence, centred on an expectation of compliance, completion of basic processes and following instruction. These variations are summarised in Table 8, below:

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>C1</th>
<th>C2</th>
<th>B2</th>
<th>B3</th>
<th>B1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Autonomous decision-making</td>
<td>Multiple complex knowledge domains</td>
<td>Integration and argument</td>
<td>Limited knowledge domains</td>
<td>Decision-making related to narrow domain</td>
<td>Decision-making related to narrow domain</td>
</tr>
<tr>
<td></td>
<td>Multiple complex skills</td>
<td>Autonomous decision-making</td>
<td>Multiple general skills</td>
<td>General inquiry in situational domain</td>
<td>Critical inquiry in all domains</td>
<td>Procedural and generalised situational knowledge</td>
</tr>
<tr>
<td></td>
<td>Critical inquiry in all domains</td>
<td>Integration and argument</td>
<td>Multiple general skills</td>
<td>Critical inquiry in situational domain</td>
<td>Decision-making related to narrow domain</td>
<td>Procedural and generalised situational knowledge</td>
</tr>
<tr>
<td></td>
<td>Integration and argument</td>
<td>Multiple complex skills</td>
<td>Multiple general skills</td>
<td>Integration and argument</td>
<td>Some comparison and justification</td>
<td>Skills in process and application</td>
</tr>
<tr>
<td></td>
<td>Multiple complex knowledge domains</td>
<td>Critical inquiry in all domains</td>
<td>Multiple general skills</td>
<td>Some integration and justification</td>
<td>Limited knowledge domains</td>
<td>Compliance with general rules</td>
</tr>
<tr>
<td></td>
<td>Integration and argument</td>
<td>Multiple complex skills</td>
<td>Multiple general skills</td>
<td>Some integration and justification</td>
<td>General inquiry in situational domain</td>
<td>Skills in application and compliance</td>
</tr>
<tr>
<td></td>
<td>Multiple complex knowledge domains</td>
<td>Integration and argument</td>
<td>Multiple general skills</td>
<td>Some integration and justification</td>
<td>Critical inquiry in all domains</td>
<td>Compliance with narrow rules</td>
</tr>
<tr>
<td></td>
<td>Integration and argument</td>
<td>Multiple complex skills</td>
<td>Multiple general skills</td>
<td>Some integration and justification</td>
<td>Critical inquiry in all domains</td>
<td>Little or no independent decision-making</td>
</tr>
<tr>
<td></td>
<td>Multiple complex knowledge domains</td>
<td>Integration and argument</td>
<td>Multiple general skills</td>
<td>Some integration and justification</td>
<td>Critical inquiry in all domains</td>
<td>Procedural skills in application</td>
</tr>
<tr>
<td></td>
<td>Integration and argument</td>
<td>Multiple complex skills</td>
<td>Multiple general skills</td>
<td>Some integration and justification</td>
<td>Critical inquiry in all domains</td>
<td>Procedural skills in application</td>
</tr>
<tr>
<td></td>
<td>Multiple complex knowledge domains</td>
<td>Integration and argument</td>
<td>Multiple general skills</td>
<td>Some integration and justification</td>
<td>Critical inquiry in all domains</td>
<td>Compliance with narrow rules</td>
</tr>
</tbody>
</table>

Table 8: Summary intended learning outcomes by case

Scaffolding

In order to meet the needs of the expected learning process, teachers organised in-class activity and resources in a range of ways. Stages and project tasks were structured to meet the scale and complexity of the project scope, and therefore do not provide further useful information regarding the project type than that presented in the intended learning outcomes and project scope above. Adjunct tasks showed only minor variations, and none were found to have a significant relationship to project type. They are therefore not described here. The primary variations were related to the degree of provision of activities, the level of individualisation of
instruction, the level of provision of knowledge resources, and the type of discursive activities used. Where activities were used to complete project tasks and detailed knowledge resources were provided, a greater degree of control over the project work was also implicated. The variation in type of scaffolding found across the projects is shown in Table 9, while the variation in knowledge resources is shown in Table 10.

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>C1</th>
<th>C2</th>
<th>B2</th>
<th>B3</th>
<th>B1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Set activities</strong></td>
<td>None</td>
<td>Common</td>
<td>None</td>
<td>Many</td>
<td>Most</td>
<td>All</td>
</tr>
<tr>
<td>for completion of project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tasks**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Individualised</strong></td>
<td>Always</td>
<td>Some</td>
<td>Always</td>
<td>Some</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>instruction**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Formal presentations</strong></td>
<td>Some</td>
<td>Some</td>
<td>Some</td>
<td>One</td>
<td>Nil</td>
<td>Nil</td>
</tr>
</tbody>
</table>

*Table 9: Summary scaffolding activities data variations by case*

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>C1</th>
<th>C2</th>
<th>B2</th>
<th>B3</th>
<th>B1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knowledge resources</strong></td>
<td>None</td>
<td>lectures,</td>
<td>lectures</td>
<td>lectures</td>
<td>Lectures</td>
<td>Lectures</td>
</tr>
<tr>
<td>supplied**</td>
<td></td>
<td>guidelines</td>
<td>guidelines</td>
<td>contents</td>
<td>guides</td>
<td>step by</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>examples</td>
<td>(many)</td>
<td>step</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>instruction</td>
</tr>
<tr>
<td><strong>Written resources</strong></td>
<td>Gather</td>
<td>Gather</td>
<td>Gather</td>
<td>Use as</td>
<td>Use as</td>
<td>Use as</td>
</tr>
<tr>
<td>required**</td>
<td>own</td>
<td>own</td>
<td>own</td>
<td>appropriate</td>
<td>directed</td>
<td>directed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Templates</strong></td>
<td>None</td>
<td>None</td>
<td>One</td>
<td>Most</td>
<td>All</td>
<td>All</td>
</tr>
</tbody>
</table>

*Table 10: Summary knowledge resources data variations by case*

The variations in scaffolding represented the continuum found in intended learning outcomes from high levels of individualisation and student control of the projects to homogenous outcomes and teacher-control of projects. In A1, students were expected to develop their own direction and to identify their own resources. The individualised nature of these projects was met with low levels of teacher control of the overall project, indicated by few set activities and knowledge resources. However
the analysis of congruence indicated that some additional scaffolding around required outcomes may have better supported students’ early understanding of requirements and confidence in presenting their work. The C1 project displayed high levels of overall student control but teacher control of some aspects of the work, particularly the team structures and development processes. This was demonstrated by the use of set activities and multiple opportunities for rehearsal of skills, and the provision of targeted guidelines and lecture material. Although it was noted in the previous chapter that more scaffolding was required for some parts of the project, this appeared to be an issue of balance rather than under-representation of scaffolding.

C2 findings showed a similar degree of individualisation to that found in A1. However, as was noted in the previous chapter, this appeared to be problematic. In particular, students appeared to struggle with the project, and did not appear to have the prerequisite knowledge to carry out most aspects of the tasks. There was therefore a need for a greater degree of scaffolding material and set activities to support students through the process. Thus in the final summary, the level of scaffolding has been adjusted to meet this need and is more in line with that found in B2. The summary of C2 scaffolding reflects the idealisation of supports to improve congruence in that project.

In B2, a high level of scaffolding was evident, with lecture material, online knowledge resources, templates and set activities. Only in the latter part of the project were students given more latitude to work outside of class activities. In B3, the project was scaffolded throughout, again with resources and activities for every aspect. Students were provided with templates for every outcome as well as examples and opportunities for testing their initial outcomes. In B1, the very high level of scaffolding was shown in the step-by-step instruction, with only low-risk activity taking place out of class. These variations are shown in Table 11 below.
Individual consultation and work in progress, students generally find own
Minimal resources, e.g. example outcomes, students
Students work independently

Some whole of class instruction, set activities
Some process resources provided
Some optional knowledge resources provided
Guidelines for outcomes provided
Students work outside class without instruction

Some whole of class instruction, set activities
Some templates for outcomes provided
Some required knowledge resources provided
Students work outside class without instruction

Mostly whole of class instruction, set activities
Most templates for outcomes provided
Many required knowledge resources provided
Students work outside class with some instruction

Whole of class instruction, set activities
All templates provided
All required knowledge resources provided
Students work outside class with some instruction

Whole of class instruction, set activities
All templates provided
All required knowledge resources provided
Students work outside class to complete minor tasks

Table 11: Summary scaffolding by case

Roles

In each case, the roles taken on by teachers and students varied in two dimensions: the explicit level of control of project tasks and decisions, conceived as the locus of control for the project; and the dominance or level of direction demonstrated during interactions between students and teachers. The role taken in relation to the locus of control of the project was related to the degree of student independence demonstrated in the project scope and scaffolding. Levels of dominance and direction during class interactions indicated the implicit behavioural roles taken by teachers and students. The variations between these two aspects of the roles were indicative of the alignment of teacher and student behaviours with the project requirements. As noted in the previous chapter, the coherence of these roles is directly implicated in the capacity of students to progress their project work effectively. In projects where there were high levels of alignment between the explicit locus of control, the scaffolding and the teacher behaviours, projects progressed well and students were highly active in seeking out and contributing to learning opportunities. In particular, there were higher levels of spontaneous discussion and questioning by students. The initial summary key words are shown in Table 12 below, with teacher indicated as (T) and student indicated as (S):
| Table 12: Summary roles data variations by case |

In A1 the locus of control for project direction was explicitly located with students. In line with the goal of independence and the desire for individualised outcomes, students did complete the bulk of work outside of class times and make decisions independently. The level of independence suggested by the project scope was found to align well with students’ level of prior experience. Nonetheless, the teacher reported that students were tending to wait for guidance rather than making decisions for themselves and that progress on projects outside of class was less than that expected. In observations of class sessions, students were found to be compliant and passive, while the teacher took on a directive role, dominating most class discussion and activity. This suggested that an alignment of the roles would be better served by a more collaborative disposition for the teacher and a more independent and active disposition for students, along with a small increase in resources around required outcomes as noted in the previous section. In the summary of roles for this project, shown in Table 13 below, the locus of control is more evenly spread between students and the teacher, in an attempt to resolve the issues found with dispositional consonance.

In C1, the locus of control for the project was generally with students. Aligned with this locus of control, student dispositions in class sessions were active, with students...
showing a tendency to work independently and drive much of the discourse in and out of class sessions. However, there was some degree of control by the teacher over the project process. This was aligned with a teacher disposition that was generally advisory but also provided guided progression through the project processes. In C2, the reverse issue from that identified in A1 was noted, but similarly with negative consequences for project progression. In this project, the locus of control was explicitly centred with the students and the teacher role was advisory, with a focus on individualised support and minimal direction. However, as described in the previous chapter, projects did not progress as expected, and students displayed tentative and dependent behaviours. This indicated that a curriculum approach with a higher degree of guidance was needed. The summary roles for C2, shown in Table 13, are therefore adjusted to reflect one approach to resolving the issues found with dispositional consonance in Chapter 5.

In B2, the locus of control for most aspects of the project was with the teacher. The teacher’s disposition was instructive, providing direction and rules during class sessions. Students were responsive learners with a tendency to await direction but also able to carry out the decision-making aspects of the project tasks at the expected level of independence. In B3, the locus of control for the project was generally centred on the teacher, but to a slightly greater degree than for B2. In this case, the teacher was directive, providing detailed instruction and rules for students to follow. Students were active participants and at times worked at a higher level than expected, but were generally reactive, waiting for instruction before taking each step in the project process. In B1, the project was entirely teacher controlled. The teacher disposition was not only directive but also controlling. Students were entirely dependent on the teacher for instruction and, although active participants, were focused on following instructions carefully at all points in the process. In all cases, the degree of control over the progression of projects was limited by the project constraints and amount of direct instruction provided for project tasks and classroom activities. These positions are summarised in Table 13 below.
Teacher: Provides feedback, critique, expert collaborator
Student: Sets direction within guidelines, drives activity, autonomous learner, junior professional

Teacher: Provides advice, sets some activity, provides feedback, advisor
Student: Manages direction within guidelines, drives interaction, increasingly independent learner

Teacher: Provides feedback, sets guidelines and activities, instructor
Student: Complies with guidelines, involved and responsive learner

Teacher: Sets guidelines and activities, instructor
Student: Follows instruction, involved and responsive learner

Teacher: Directs all activity, controller
Student: Follows rules, dependent learner

Table 13: Summary teacher and student roles by case

Assessment

Assessment of products showed a remarkable similarity across the cases. However, some differences were noted. All of the variations were aligned with the variations in the scope and complexity of the projects. The summary data for variations in assessment are presented below in Table 14.
In A1, students were expected to provide multiple complex and integrated outcomes. There was a focus on the capacity of students to have identified and resolved the complex problems encountered. As previously noted, there were no explicit criteria related to the theoretical knowledge employed. It seems likely that in this case the lack of congruence was due to an implicit concern with theoretical knowledge as applied in any specific instance. Students were not required to explicitly defend theoretical concepts but to demonstrate them through the problem solutions. The overall criteria in A1 were linked to sophisticated mastery of the design processes, including integration of multiple domains of knowledge and skills. Students were also required to mount a defence of their work, through presentation to a design jury. In C1, students were expected to present one or more complementary pieces of work, integrating the concept and justification. There was a focus on the thoroughness of approach, the use of appropriate processes and a demonstration of completed investigations. In C2, students were expected to submit a single piece of work with supporting materials, and the focus was on the completion of the required processes and the use of logical progression between parts. In B2, students were expected to submit an outcome made up of several thematically linked parts demonstrating
logical visual process and the application of design skills. In B3, students also presented an outcome made up of several parts, but these constituted a single solution to a narrow problem. The focus of the criteria was on the competency of the application of rules. In B1, students were expected to provide a collection of images meeting competent levels of application of one process. The focus of the criteria was adherence to requirements. These variations are summarised in Table 15 below:

<table>
<thead>
<tr>
<th>A1</th>
<th>C1</th>
<th>C2</th>
<th>B2</th>
<th>B3</th>
<th>B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form: multiple complex pieces or parts, integrated with argument</td>
<td>Focus: professional level mastery of all aspects of process and product</td>
<td>Form: one or more complementary pieces or parts, with justification</td>
<td>Focus: thoroughness, professionalism and processes</td>
<td>Form: one piece with supporting materials or parts, logical process, application</td>
<td>Form: small number of thematically linked parts</td>
</tr>
<tr>
<td>Form: one simple piece</td>
<td>Focus: basic competency</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 15: Summary assessment by case*

**Summary of variations**

As noted in the first section of this chapter, the design education literature is silent on the variation in projects, other than to indicate their breadth of possibility. There are, nonetheless, clear indications in the literature on project methods that there are variations in the project curriculum relating to the scope, purpose and locus of control of projects. It has also been argued that the degree of support teachers provide to students is dependent on the learner stage and the scope of the project (Barron, et al., 1998; Kilpatrick, 1918). Kilpatrick (1918) also points out the importance of providing sufficient support for both the possibility of success and the challenges associated with learning. As demonstrated in the analysis of congruence in Chapter 5, projects are aligned to program levels and the perceived capacities of students. The subsequent decision-making around levels of scaffolding and roles taken by students and teachers is an important aspect of project methods.
In the previous section, the characteristics of the identified variations across the projects were provided in summary tables. These variations were organised according to their level of complexity and the degree of autonomy and responsibility expected of students in the decision-making process.

In A1, there was a high degree of complexity and autonomy embedded in the project scope, with the locus of control firmly resting with the students. The problem situation required students to engage with multiple ill-defined problems, all of which interacted with one another to make the problem solution for one aspect potentially problematic for another. The knowledge domains included situational, theoretical, procedural and technical knowledge. In each knowledge domain, students were expected to carry out critical inquiry and the selective application of knowledge in relation to their project direction and the emerging problems. Students needed to take account of multiple user needs and to comply with professional level technical requirements. The problem set was therefore both internally and externally complex. That is, the problems in themselves were complex, and further challenges were found in the external constraints of user groups and the identification of knowledge domains. In the analysis, it is argued that high levels of student responsibility and teacher collaboration are congruent with this process. The assessment of A1 was similarly approached with a concern for individual approaches, sophisticated mastery of professional practice, and a degree of knowledge and insight reflective of the complexity of the project scope. A1 can therefore be characterised as an Independent Inquiry Project, in which students are set a complex multi-part problem situation or context that requires significant levels of independent decision-making, knowledge selection, application, and integration.

In C1, the complexity and scope of the project were significantly less than that for A1. Students were expected to carry out inquiry in a single domain, working within guidelines for some aspects of the project. While students were expected to take responsibility for the decision-making in regard to project content and had a significant amount of independence in determining project direction, the locus of control was also more divided between students and teachers than in A1. A higher degree of scaffolding was also found, particularly for the project management aspects of the project. In the analysis, it was noted that a higher degree of scaffolding in the written aspects of the work would have benefited students. However, this would not necessarily impact on the locus of control. Similarly, while students were expected to acquire situational knowledge at a high level, and to apply procedural
knowledge, minimal theoretical or technical knowledge was required. Thus the project did not require the degree of self-regulated inquiry found in A1. C1 can therefore be characterised as an *Independent Project*, involving a multi-part problem set with some internal complexity and a requirement for integration of situational and procedural knowledge, and where students work independently for most aspects of the project.

In C2, independence was more restricted than either A1 or C1. Students were expected to demonstrate that they could follow provided instruction in carrying out an interview. Some initiative and independent decision-making were required in identifying the client organisation, setting up meetings and progressing the report. However, unlike the investigations carried out in C1, students worked to a timetable and clear guidelines for carrying out the interview, including templates for both interview questions and data. Thus control was skewed to the teacher who defined the initial processes and content of the work. Knowledge acquisition itself was also more limited than that found in A1, although still concentrated on situational and procedural domains. In the analysis, it was demonstrated that the project would have been better structured to include the provision of a higher level of scaffolding, and provision of knowledge resources around the topic area and the written aspects of the work. In B2, similar characteristics were identified to those in C2. Specifically, that the early parts of the process were highly structured, giving way to opportunities for students to address visual problems as they emerged. In B2, students were required to work within close direction regarding the structure, contents and visual problem-solving work. The scope of the project in relation to knowledge was slightly more limited than in C2. However as previously noted, C2 would have benefitted from a greater degree of control of the outcomes and knowledge resources. As with C2, the project was structured to allow students to develop their own processes rather than to engage with external influences to any great degree. Similarly, assessment was focused on general competencies, and these were supported by templates that limited the degree of risk to these aspects of the project outcomes. Thus both B2 and C2 can be characterised as *Guided Projects*, involving a singular problem with connections between a single knowledge base and findings from guided activities, and where students work independently in the application and integration of provided knowledge sets.

In B3, the problem set and scope of work were more limited still. In this project, students were expected to work within a clear set of steps to complete a procedure
involving consistent application of concepts. While the thematic approach was similar to that found in B2, in this case the locus of control was with the teacher in relation to all aspects of the process and outcomes other than the visual style. While students were expected to make use of knowledge resources, these were strongly focused on the development of symbols – a very narrow domain. Templates and instruction were provided for each step, and students worked through these steps with little independence. This was also reflected in the emphasis in assessment on compliance with technical requirements and the limited outcomes. B3 can therefore be characterised as a Directed Project, involving a series of activities leading to a larger project outcome, in which students apply the provided knowledge base within a narrow domain by following instruction.

In B1, the scope of work was limited to activities carried out over three class sessions. The locus of control in this project was also firmly with the teacher, who provided step-by-step instruction regarding each task, templates and all knowledge resources. There were no external complexities or substantial problems to be solved, nor was there a user to whom students should orient their outcomes. Assessment similarly was oriented to completion and compliance with requirements, with only minimal concern for the quality of outcomes in relation to self-expression. As will be seen in the following chapter, the literature on project methods indicates that projects involve problems or driving questions, initiative and independent problem-solving (Adderley, et al., 1975; Barron, et al., 1998; Mergendoller, et al., 2006). B1 did not demonstrate any of these qualities, and therefore cannot be considered to be a project. Rather, it was a Project-oriented Activity, involving a series of directed tasks that are designed to aid students in gaining basic skills or competencies and an awareness of processes, in particular the basic skill sets appropriate to later projects.

The project typology

The variations described above can further be reduced to defining characteristics as a typology. In an earlier paper published on this topic (Lee, 2009), I utilised the analysis of the cases prior to the adjustment for congruence and focused on the variation in process and product controls. In that paper the typology comprised six project types. The demonstration of congruence of variables in C2 meant that for this thesis, C2 was redefined as being more similar to B2 than it was different, particularly in the level of independence and scaffolding required. In addition, the categories

Project methods as the framework for undergraduate design education
have been redrafted to better reflect the analysis and to better define the key characteristics of each project type. The typology presented in this thesis (Figure 8) is therefore a revised and idealised typology, incorporating the changes required to meet the requirement for congruence across the variables, resulting in a reduction from six to five project types.
<table>
<thead>
<tr>
<th><strong>Independent inquiry project (A1)</strong></th>
<th><strong>Process</strong></th>
<th><strong>Product</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time:</strong> 12-14 weeks +</td>
<td><strong>Activity:</strong> Generally independent work on project tasks, individual review discussions, student-directed peer support.</td>
<td><strong>Form:</strong> Artefact and defence outcome including presentation, thesis, product, documentation, oral defence. Multiple interrelated and integrated parts. <strong>Criteria:</strong> Complex decision-making, depth and breadth of inquiry, critical analysis, synthesis and formulation of arguments through thorough exploration of a field, coherent application of knowledge and sophisticated treatment of problems.</td>
</tr>
<tr>
<td></td>
<td><strong>Knowledge orientation:</strong> Critical inquiry in theoretical, situational, technical and procedural domains.</td>
<td><strong>Knowledge orientation:</strong> Critical inquiry in theoretical, situational, technical and procedural domains.</td>
</tr>
<tr>
<td></td>
<td><strong>Knowledge resources:</strong> None or general/principles only, student chooses whether to use and should generally gather own.</td>
<td><strong>Knowledge resources:</strong> None or general/principles only, student chooses whether to use and should generally gather own.</td>
</tr>
<tr>
<td></td>
<td><strong>Problem set:</strong> Multiple parts, internally and externally complex, integration of audience or user needs.</td>
<td><strong>Problem set:</strong> Multiple parts, internally and externally complex, integration of audience or user needs.</td>
</tr>
<tr>
<td></td>
<td><strong>Controls:</strong> Level of requirement and form of outcomes. Little or no defining structures.</td>
<td><strong>Controls:</strong> Level of requirement and form of outcomes. Little or no defining structures.</td>
</tr>
<tr>
<td><strong>Capabilities:</strong> Independent inquiry, definition and resolution of problems including convincing argument.</td>
<td><strong>Teacher role:</strong> Sets target outcomes, supports progress, collaborator. <strong>Student role:</strong> Sets project direction, self-reflective, self-regulated and self-directed, autonomous learner.</td>
<td><strong>Teacher role:</strong> Sets target outcomes, supports progress, collaborator. <strong>Student role:</strong> Sets project direction, self-reflective, self-regulated and self-directed, autonomous learner.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Independent project (C1)</strong></th>
<th><strong>Process</strong></th>
<th><strong>Product</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time:</strong> 7-9 weeks</td>
<td><strong>Activity:</strong> Students generally progress own work, some project tasks as in-class processes, structured peer support.</td>
<td><strong>Form:</strong> Artefact and supporting material showing process including presentation, product, documentation. Several integrated parts including justification. <strong>Criteria:</strong> Decision-making, thorough and consistent development and articulation of a solution using appropriate processes and articulation of a solution using appropriate processes and knowledge for the field, depth of inquiry in situational domain, consistent and resolved treatment of problems.</td>
</tr>
<tr>
<td></td>
<td><strong>Knowledge orientation:</strong> Critical inquiry in situational domain and application of procedural and technical knowledge.</td>
<td><strong>Knowledge orientation:</strong> Critical inquiry in situational domain and application of procedural and technical knowledge.</td>
</tr>
<tr>
<td></td>
<td><strong>Knowledge resources:</strong> Some general process and guideline resources provided. Students can reference as appropriate but should also gather own.</td>
<td><strong>Knowledge resources:</strong> Some general process and guideline resources provided. Students can reference as appropriate but should also gather own.</td>
</tr>
<tr>
<td></td>
<td><strong>Problem set:</strong> Several interrelated parts, some integration of parts, one or more unfamiliar audiences.</td>
<td><strong>Problem set:</strong> Several interrelated parts, some integration of parts, one or more unfamiliar audiences.</td>
</tr>
<tr>
<td></td>
<td><strong>Controls:</strong> All students follow general instructions regarding form of final outcome.</td>
<td><strong>Controls:</strong> All students follow general instructions regarding form of final outcome.</td>
</tr>
<tr>
<td><strong>Capabilities:</strong> Independent investigation and development related to a broadly prescribed area, culminating in the production of an outcome demonstrating breadth and depth of review.</td>
<td><strong>Teacher role:</strong> Provides general process instruction, supports progress, guide. <strong>Student role:</strong> Drives most project direction, manages own timelines and defines content, active and increasingly independent learner.</td>
<td><strong>Teacher role:</strong> Provides general process instruction, supports progress, guide. <strong>Student role:</strong> Drives most project direction, manages own timelines and defines content, active and increasingly independent learner.</td>
</tr>
<tr>
<td>Scope</td>
<td>Process</td>
<td>Product</td>
</tr>
<tr>
<td>-------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Guided project (C2/B2)</strong>&lt;br&gt;&lt;br&gt;<strong>Time:</strong> 4-7 weeks</td>
<td><strong>Capabilities:</strong> Basic integration of investigation and development in a pre-defined or narrow topic, making use of decision-making in one domain.&lt;br&gt;&lt;br&gt;<strong>Problem set:</strong> Small number of non-complex parts, linear or thematic integration, familiar or notional audience.&lt;br&gt;&lt;br&gt;<strong>Knowledge orientation:</strong> Application of provided procedural and theoretical knowledge, some situational knowledge inquiry.&lt;br&gt;&lt;br&gt;<strong>Controls:</strong> All students follow same instructions to complete early stages. Some templates may be provided.</td>
<td><strong>Knowledge resources:</strong> Most general resources provided, including process and topic. Students should reference as appropriate and gather own in addition.&lt;br&gt;&lt;br&gt;<strong>Activity:</strong> Many project tasks as in-class processes, some independent completion of stages, some individual consultation.&lt;br&gt;&lt;br&gt;<strong>Teacher role:</strong> Provides structure, knowledge and guidelines, supervisor.&lt;br&gt;&lt;br&gt;<strong>Student role:</strong> Develops work within timelines, manages self and demonstrates some self-regulation and self-editing, responsive learner.</td>
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<td><strong>Directed project (B3)</strong>&lt;br&gt;&lt;br&gt;<strong>Time:</strong> 3-5 weeks</td>
<td><strong>Capabilities:</strong> Procedural development, connecting prescribed processes into a larger outcome. Decision-making related to linear development of one aspect of the work.&lt;br&gt;&lt;br&gt;<strong>Problem set:</strong> One part in some variation, linear processes, general or no audience.&lt;br&gt;&lt;br&gt;<strong>Knowledge orientation:</strong> Application of basic procedural or situational knowledge.&lt;br&gt;&lt;br&gt;<strong>Controls:</strong> All students follow same instructions to complete most activities. All templates are provided.</td>
<td><strong>Knowledge resources:</strong> Most general resources provided, including process and topic. Students should use as directed or needed.&lt;br&gt;&lt;br&gt;<strong>Activity:</strong> Most project tasks completed as in-class activities, some low-risk progression between classes, instruction and feedback at each stage.&lt;br&gt;&lt;br&gt;<strong>Teacher role:</strong> Provides instruction for most project activity, manages project processes, instructor.&lt;br&gt;&lt;br&gt;<strong>Student role:</strong> Carries out project tasks as instructed, some independence in time-management, some decision-making with regard to project content, reactive learner.</td>
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<td><strong>Project-oriented activity (B1)</strong>&lt;br&gt;<em>Time:</em> up to 3 weeks</td>
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<td><strong>Capabilities:</strong> Skills and knowledge in narrow field aiming to develop skills in single process.&lt;br&gt;<strong>Knowledge orientation:</strong> Implementation of basic processes as instructed.&lt;br&gt;<strong>Problem set:</strong> One part, linear steps/processes for simple problem.&lt;br&gt;<strong>Controls:</strong> All students follow same instructions to complete specific distinct activities working into templates.</td>
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<th>Process</th>
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<td><strong>Knowledge resources:</strong> All knowledge resources provided, including process and topic. Students must use as directed to complete all project stages.&lt;br&gt;<strong>Activity:</strong> Generally all tasks or steps completed in class with some instructed and low-risk tasks carried out between sessions.&lt;br&gt;<strong>Teacher role:</strong> Provides detailed direction for all steps, director and controller.&lt;br&gt;<strong>Student role:</strong> Follows instruction with no independent decision-making or time-management other than completion of basic tasks, dependent learner.</td>
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<td><strong>Form:</strong> Artefact comprising step outcomes or culmination of completed tasks.&lt;br&gt;<strong>Criteria:</strong> Compliance with requirements, basic competency in following instruction, completion of tasks.</td>
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As indicated in the first section of this chapter, the hierarchal approach to the typology reflects the organisation of descriptions of project types in the literature. The project types described by Adderley et al also suggest that lower level projects are more suitable for the early years of education, and serve as introductory experiences. Spronken-Smith et al (2010) also constructed a stepped model for inquiry, reflecting some of the progressive features of the project types found in this study. They argue that the progression to independent inquiry reflects ‘the desire that graduates should attain the highest level before graduation’ (2010, p. 32). Certainly this was reflected in the project cases reviewed for this study. Projects reflected the level of prior knowledge and experience expected of students, linked to either the level of the program or the likelihood that students would have had similar prior experiences across the knowledge and skill domains. Levels of autonomy were clearly linked to the level of the program. For example in A1, C1 and C2, assumptions were made about student capacity to carry out project tasks and set their own schedules without direction. In these cases, this assumption extended to knowledge and skill domains and consequently, the types of scaffolding provided. Problems experienced by students in some aspects of these projects indicated that those assumptions should not be consistently applied across the variables. While students might be confident of managing their own work, attention is needed to the gaps in their prior experience, and whether scaffolding should be increased or emphases shifted to either further develop student capacity or more appropriately target the intended learning outcomes and assessment criteria.

While the application of the types across progressive year levels was consistent in the project cases reviewed for this study, an initial test of the typology across the faculty indicated that year level was less important than the degree of expected student experience in particular syllabus areas, and the nature of the syllabus itself. Lower level projects tended to be utilised where there was an explicitly high degree of technical knowledge development. In contrast, higher level projects tended to be present where the emphasis lay in conceptual and problem-solving skill development. There were also discipline differences, with the more traditionally technical areas showing a dominance of the lower level project types. This indicates that teachers select projects with concern for the degree of autonomy and variation expected in learning outcomes, rather than about consistent progression of student autonomy through programs. Further, this very tentative analysis indicates that conceptual and problem-solving foci in projects is linked to providing sufficient gaps in instruction for students to practise those skills, while there is an expectation of development of
compliance skills and knowledge in projects with a technical focus. The summary table for this analysis is provided as Appendix D.

Chapter summary

In this final chapter of analysis the variations across the project cases have been presented. In the first section, the existing definitions of variation between projects were explored for their relevance to the cases in this study. It was demonstrated that while relevant, the existing definitions were not sufficient for the project cases. However, the use of levels of complexity and locus of control of projects as organisational concepts in the literature provided a guiding structure for an analysis of variation across the cases. Each of the variables showing distinct differentiations across cases was then described, including summary descriptions of their characteristics.

Following from the analysis of congruence, in which A1 and C2 were shown to have distinct misalignments in some variables, it has also been demonstrated that adjustments can be made to those projects to improve congruence, without disrupting their overall purpose or structure. The outcome of this process is the characterisation of five project types that display clear variation across types with internal alignment of each of the scope, complexity, time allocation, degree and type of scaffolding and roles of teachers and students. These were defined as: Independent Inquiry Projects, Independent Projects, Guided Projects, and Directed Projects. B1, it was noted, did not display the characteristics of project methods as defined in the literature, and was therefore defined as a Project-oriented Activity.

In conclusion, a typology of project methods in the design education context, and as found in this study, was presented. The hierarchical nature of the typology was noted as a common feature of project types in the literature and, based on a tentative analysis of the use of project types in the faculty, early questions were raised regarding the means by which project types might be selected for particular program levels or student cohorts.
Chapter 8: 
Conclusions and implications

The introduction to this thesis laid out the context, aims, questions and boundary terms of this study, and briefly introduced the methods chosen. This was followed by the methodology, describing more fully the basis for carrying out a qualitative case study in relation to the research aims. Chapter 3, following the methodology chapter, presented the development of the systems-based curriculum model that was used as the organising structure for data, and described its contribution to the literature. In the chapters following the discussion of systems approaches, the details of the cases and the analyses of the project cases have been presented. The analyses of the cases was carried out using three lenses: congruence within the cases, commonalities across the cases and variations across the cases. Rather than provide a single chapter of literature review, and in order to contextualise these three very different conceptualisations of the cases, the literature was integrated with each chapter.

This final chapter of the thesis lays out the achievement of the research aims, the significance of the thesis and its contribution to the literature, significance and implications of the research for practitioners, and the limitations and implications of the study for further research.

Achievement of the research aims

The initial aims for this PhD study, as described in the introduction to this thesis, were to:

- Identify a language that connects design educators to mainstream research in education
- Explore the structure, components and processes of design education curriculum
- Produce a framework that may assist design educators in the critical development of their own teaching practice.
The language that was identified was that of project methods. In the introduction to this thesis, the similarities between definitions of design education curriculum and project methods were drawn out. In order to elaborate the relationship between design education projects and project methods in the literature, and to address the remaining two aims of the study, a systematic empirical study of projects in the design education context was undertaken. The methodological approach selected was a qualitative, case-based research approach. This approach was selected in response to the challenges associated with a research study for which there is little prior literature and the need for an exploration of the phenomena of design education projects as they occur in situ. As a result a wide range of data sources were utilised, specifically; unit documents including outlines, project briefs, teaching materials and student work; interviews with teachers, and; observations of scheduled classes. These data sources provided an extensive data set for a comprehensive review and systematic structuring of information regarding the details of project curriculum.

The data were iteratively analysed using a range of methods from the field of qualitative inquiry. Within each project case, and aligned with each of the driving questions of the study, four layers of analysis were carried out. These were:

- Analysis of the data to model categories and variables as ‘containers’ for data, thereby describing the components of the curriculum

- Analysis of the congruence of variables within each case, thereby explaining the internal logic of each case

- Thematic analysis of the variations in the data across the variables, thereby describing the differences between projects

- Thematic analysis of the commonalities in the data across the variables, thereby describing the key features of projects

The first of these processes resulted in the development of a curriculum model for curriculum, described in Chapter 3 of this thesis. The analyses of congruence, commonality and variation have been presented respectively in Chapters 5, 6 and 7. Collectively, these chapters present findings representing an exploration of the complexity of structures, components and processes of design education curriculum. They also provide three frameworks that may be utilised by design educators in the critical development and review of their own teaching practice, along with a definition of projects in the design education context. There is substantial evidence in this
thesis that the aims of the study have been met, and further, that each of the questions has been addressed in such a way as to make a significant contribution to the field.

**Significance of the thesis and contribution to the literature**

In the introduction to this thesis, the background and scope of the study were outlined. The summary of literature showed that there was very little debate regarding the nature of design education practice, and design education projects in particular. Similar problems to those found in the design education literature exist in the literature on project methods. As many authors have noted, while there is a reasonable case-based literature, there is a lack of systematisation, theoretical depth and detailed elaboration of the educative process related to project methods. Indicative of this is that the key text for project methods remains that by Adderley et al (1975). There are additional challenges in the lack of clear elaboration of the curriculum, its components and complexity. Although several authors have described the curriculum as comprising a multiplicity of variables, and some have attempted system models to capture these, there are few empirically based examples on which to draw. Those that exist are not comprehensive. There are therefore gaps in all three areas of the literature: undergraduate design curriculum; project methods, and curriculum. At the beginning of the study, I set out to answer a specific set of questions linked to these gaps. In addition to the overarching question of how projects in design education might be described, the questions I intended to answer were:

- What interacting variables are observable? How might they be mapped to provide a cohesive model?
- How do these variables relate to one another? How might internal coherence be evaluated?
- Are there commonalities among projects? If so, are these sufficient to provide a definition of projects in the undergraduate design context?
- Do projects differ? If so, how do they differ from one another?
As each of these questions was dealt with progressively in the thesis chapters, and prompted quite distinct contributions to the literature, each are dealt with in sequence in the following sections.

**The curriculum model**

Systems principles allow for mapping of the characteristics, patterns and processes that occur in any system, including the curriculum, over time. While providing no ‘universal rules’, systems theory generates a rich, complex account of phenomena that accords with the qualitative approach taken to this study. This study commenced with an analysis of the data to provide the basis for development of a comprehensive systems-based model of the curriculum and the identification of the interacting variables of the curriculum. The system model developed for this study represents a substantial modification and extension of existing models as well as being drawn from, and providing structure for, the data from the study.

In reviewing existing models of educational systems, two influential and interrelated models were identified. The Dunkin and Biddle model for the study of classroom processes and the Biggs 3P model of teaching and learning. A review of literature and a critique of the models identified several challenges both with the uses of systems models in education, and with those particular models. In particular, the 3P model of teaching and learning collapses levels of granularity that have subsequently appeared in adaptations to the model by other authors. Analysis in this doctoral study, in particular the iterative grouping and sub-grouping of data, provided the basis for naming categories and variables within the model. The process was largely interpretive and tentative, but nonetheless is empirical. The interpretive process and iterations of refinement were also an attempt to resolve conceptual challenges with mapping curriculum into a system structure. Additional challenges existed in the mapping of the system to maintain clarity and specificity of the categories and variables, in the modelling of the system to identify relations between the variables, and in the analysis of the system to provide valid explanations for congruence between the categories and variables.

The curriculum model presented in this thesis resolves the problems with granularity and consistency identified in existing models. It retains the difficulty identified in the literature regarding the teleological complexity of curriculum, that is, the distinctions and overlaps between plans and enactment. This causes difficulties in associating
data from interview, observation notes and documents to particular variables. Each of these data sources occurs at a different point in the curriculum process, and often represents concepts that are present at more than one point in the process. As with all design problems, there is no absolute stopping point or correct result in developing such a model. The organisation of variables therefore remained in flux until the model was sufficiently stable to enable the analysis of the data with some clarity. The model in its current iteration was workable as a basis for organisation of the data.

This system model represents a contribution to the literature related to system models of educational contexts. Specifically, in attempting a comprehensive model with consistent granularity and conceptual clarity, some of the challenges of constructing educational system models have been clearly defined. The resulting curriculum model also contributes to the literature on curriculum. The model presented in this thesis provides a detailed and empirically based structure that may be adapted for other contexts. The model further demonstrates the degree of complexity involved in understanding the curriculum and the context in which it resides.

**Issues of congruence**

In Chapter 5, the congruence within and between variables was reviewed for each project case. Congruence was defined as the internal logic and compatibility between the data in variables and between the data and the goals of the system. This concept has been given a number of terms, including the widely used ‘alignment’ as indicated in ‘constructive alignment’ (Biggs, 1999). Building on the curriculum model and systems approach, the comparison is of reciprocal and interdependent, but not necessarily causal, relationships between parts of the curriculum. Within the variables, each set of data was compared for the presence of consistent concepts, actions and characteristics and their relationship to learning, particularly that described in the intended learning outcomes.

Several models for the evaluation of congruence were reviewed for their applicability to the study. Existing criteria for evaluation of congruence used in school contexts, such as that presented by Porter (2002) and Smithson (2010) tend to focus on the consistency of the amount and type of information provision to students in relation to standardised curriculum and examination content. These models were found to be insufficient as a means of measuring the consistency of a full range of variables in
the curriculum. In particular, they do not provide the basis for evaluating behaviours, goals, activities and conceptual variations found in the curriculum conceived as it was in the curriculum model developed for this study. Further, they do not provide sufficient flexibility to evaluate curriculum in a context where the teacher bears the greater responsibility for developing curriculum goals and assessment strategies. In such a context, the aims of the curriculum, and the means of achieving those aims, are likely to be more variable and require more a more interpretive and less quantitative approach. In the university context, Biggs’ (Biggs, 1999) description of alignment has been the most widely used source. However Biggs’ conceptualisation of constructive alignment does not provide a set of summary criteria with which to judge whether alignment is occurring.

A relatively comprehensive, flexible and conceptual model is presented by Webb (1997). Webb’s set of criteria for the evaluation of alignment was used as the guiding model for evaluating the congruence of data across the variables in the curriculum. Webb’s model, in common with the other identified models for evaluation of congruence, emphasises knowledge content. Adaptations were therefore made to the criteria to provide a more balanced view of the data. In adapting the model, the criteria were spread across four major areas of concern: articulation, categorical concurrence, dispositional consonance, and equity. These areas respectively represented the coherence of the overall curriculum with the context and student level of capacity, the consistency of representation of concepts across the categories, the relations between student and teacher behaviours, and the presence of opportunities for students to achieve the goals and carry out assessment that would demonstrate their learning.

In addition to the analysis of coherence within each of the criteria, the analysis covered the relationships between the criteria. For example, the relationship between the level of expected capability and the scope of the project as described in articulation, and the way in which teacher and student behaviours reflected those expectations were examined. The adaptation of Webb’s criteria to allow for a more balanced overview of congruence across the curriculum contributes to the literature on alignment. In particular, the adaptation of Webb’s model to the higher education context, and the elaboration of processes associated with evaluating congruence across the curriculum, advance the literature on the evaluation of curriculum outside of the school context, and particularly as a set of curriculum evaluation criteria that support a more qualitative and reflexive approach to evaluation.
Findings showed that there was general congruence between most aspects of the curriculum in each case. While there were some inconsistencies, the strongest aspects of congruence were identified in the alignment of the level of expectation, degree of scaffolding, scope of the project, and the degree of equity afforded by the project method. In particular, the affordance of multiple types of activity, integration of activities and resources with the project tasks, assessment of multiple domains within the project processes and outcomes. This reflected and extended the assertions in the literature that projects are integrated, authentic and active learning experiences.

There were also instances of incongruent data. Where this was the case, the inconsistencies tended to be reflected across multiple criteria. Instances of incongruence included misalignment of the amount of scaffolding with student capacity in combination with the project tasks, the use of esoteric intended learning outcomes and assessment criteria such as aesthetics, creativity or innovation, and in two cases, the inconsistent presence of theoretical knowledge as an aspect of project development. These aspects of the project cases also appear in the literature, and were examined in more detail in the Chapter on the common characteristics of projects (Chapter 6). Another area of concern was the degree to which teachers’ control of the project decision-making and in-class discussion was correlated with student behaviour and capacity to carry out the projects at the level of independence expected.

In the design education literature, these aspects of congruence have not hitherto been subject to empirical studies outside studies of the practice of critical review. This gap in the literature is significant. Empirical studies of design education practice are sorely lacking in criteria for evaluation that relate to the broader educational discourse. By carrying out an empirical study of the internal logic of projects in this context, a model has been provided that forms the basis for an examination of the common claims made in the literature regarding the alignment of teacher behaviour and student learning in design education.

**Common characteristics of projects**

In 1975, Adderley et al provided a succinct description of the common characteristics of educational projects. This set of characteristics is still in use today (Helle & Tynjala, 2004; Mills & Treagust, 2003; Utulu, Alonge, & Emmanuel, 2010). The characteristics of projects include the presence of a problem for which a solution has to be devised;
a variety of educational activities and a requirement for students to take initiative; culmination in an end product; work over a considerable length of time, and; teachers taking the role of advisors, rather than directors, over some or all of the project stages.

In the study reported in this thesis, the project cases demonstrated some alignment with this definition. In particular, the projects were structured around the solution to a problem or problem situation; culminated in a product; involved a variety of educational activities, and necessitated some degree of student initiative. However these characteristics were not found to be sufficient to describe the cases. In particular, there were insufficient definitions of some of the characteristics. Three broad categories of common characteristics were identified and compared with the literature on project methods and design education. These were: the authentic nature of the projects; the use of particular knowledge and skill sets; and the nature of the educational processes. Within these categories it was argued that the project cases showed common characteristics of professional authenticity, based on the use of professional structuring devises including briefs, stages, problems, constraints and external audiences. It was further argued that the knowledge and skill sets privileged in the project context were largely situational, procedural, technical and generic rather than theoretical or philosophical. It was also argued, based on their prevalence in the data, that creativity and problem-solving skills were well represented but not clearly articulated. Although there are mentions of each of these characteristics of project methods across the literature, prior to this study there has been little in the way of detailed or empirical description of these characteristics in relation to the project curriculum in undergraduate design education.

The findings also reflected the claims in the literature that project methods are integrated experiences in which all educational activities are oriented to the acquisition and application of knowledge, skills and behaviours within the project context. Similarly, assessment was found to be focused on the evaluation of achievement within the project, often through the product or products, but also through evidence of processes that have been undertaken, peer review, articulation activities and self-assessment. In line with the view of most writers on project methods, and proponents of design curriculum, the projects involved some degree of student independence, initiative and self-regulation. Perhaps more importantly, there was a personal aspect to the projects derived from the spaces left in the curriculum for students to devise solutions integrating their own perspectives and preferences. In
other words, teachers took on a variety of roles in response to the project type, at various project stages and their perceptions of student need. This responsiveness was identified as a key characteristic in the findings for common characteristics as well as in relation to congruence and variation. It was also one of the most significant departures from the existing literature.

**Project types**

In Chapter 7, the variations between the project cases were presented. Four existing typologies of project methods were identified in the literature. Although in each typology there were categories that represented aspects of the project cases, none provided sufficient categories, nor captured the distinct differences, between the project cases in this study. Nonetheless, they did provide a conceptual framework that reflected the data. That is, project variations organised by the degree of complexity and scope of each project, and by the locus of control or responsibility in a continuum from teacher control to student control.

The content of the system variables showed distinct differences across the cases. Specifically, the project scope, time allocation, intended learning outcomes, scaffolding, teacher and student roles, and assessment. Following the analysis of congruence, changes were suggested for A1 and C2. These changes provided the logical basis for their allocation to, and the definition of, specific project types in a hierarchy of complexity and autonomy. The resulting typology was therefore an idealised rendering of project types based on the iterative analysis of the data, rather than a strictly empirical typology.

Findings showed that, with the exception of B2 and C2, each of the project cases could be distinguished as a different project type. In C2, the suggested increase in time, scaffolding activity and resources brought the degree of complexity and autonomy in line with B2. These two projects were identified as sharing sufficient commonality, therefore, to be described within the same project type.

A1, with the largest project scope, high levels of expected student control over the project direction, emphasis on independent inquiry, and a requirement for complex decision-making, was the most demanding of the projects. This was characterised accordingly as an Independent Inquiry Project. C1, with a more constrained scope, also demonstrated lower levels of independent inquiry and decision-making. The complexity of the problems encountered was also lower than that shown in A1, with
more scaffolding activity and resources provided in some domains. Nonetheless, this project still required students to carry out the work largely independent of teacher guidance. The project in C1 was therefore characterised as an Independent Project. B2 and C2 showed still more structured support, with smaller problem scope requiring students to carry out development in narrow domains, with a focus on depth in one aspect of the problem. There was also less student autonomy, with students (ideally) provided more guidance and scaffolding over more aspects of the project tasks, and expected to complete short project stages in the order they were provided, working to templates. These projects were therefore characterised as Guided Projects. B3 was yet again more limited, with scaffolding provided to the level of procedural steps that students were required to complete in order of their provision. Templates defining the precise layout of outcomes were also provided to students. The teacher therefore controlled most aspects of activity, while students were expected to make use of the resources to complete the work competently. The scope of the project was limited to a single, sequential problem, with iterative refinement of solutions under teacher direction. This project was therefore characterised as a Directed Project.

In B1, the scope of activity was limited to following step-by-step instruction over a short period of time. Although this case somewhat reflected the definition of mini-projects provided by Adderley et al, it did not bear the hallmarks of project methods. In particular, there was no external problem or driving question to be addressed, and involved no initiative on the part of students. This project was therefore characterised as a Project-oriented Activity rather than a project.

The presentation of a typology of projects in the design education context is a significant contribution to the literature in both design education and the broader educational field. Although I have previously published a typology (Lee, 2009), the iteration presented in this thesis advances the conceptual structure and provides a more detailed view of the way in which projects are differentiated by their complexity. The typology is of significance to both undergraduate design education and the wider field. Notably, the earlier published typology has been cited in papers relating to project methods the education of ICT teachers (Starcic, 2010) and Mechatronics (Younis & Tutunji, 2010) and in a thesis regarding the development of design competencies at secondary school level (Federie, 2010).
Significance and implications of the research for practitioners

While there has been strong debate in the literature regarding the need for changes to the content of design education, there remains very little empirical evidence about the contemporary curriculum in design. What exists tends to focus on specific interventions or practices within an instance of delivery, and with a few exceptions, does not make use of existing educational theory in any depth. This lack of engagement with educational theory has several implications for both theoretical debate and the practice of design educators. Most significantly, design educators have little in the way of a language with which to evaluate their practice in relation to the broader educational field. The findings presented in this thesis demonstrate the relevance of the educational concepts found in the literature, and in particular of project methods, to the design education context. This knowledge provides the basis for practitioners to explore their own practice and to engage in the wider educational debate.

The findings acknowledge the highly complex nature of the curriculum, and the associated complex challenge of establishing congruence and clarity in the intended learning outcomes, scaffolding, behaviours and assessment. The criteria for the evaluation of congruence used in this thesis provide a more specific set of categories than has previously been available, as well as organising structures and mechanisms through which data can be evaluated for internal logic.

The analysis of congruence demonstrated that in cases where scaffolding was misaligned this appeared to be the result of errors in curriculum design rather than of broader practice. In each project case, consideration of each variable in relation to all other variables was required, indicating that judgement regarding alignment needs to be made on a case-by-case basis. Common pitfalls in curriculum design and delivery, and their potential remedies, have also been presented. Problems with scaffolding, in particular, can be relatively easily remedied by the provision of more or less scaffolding activity and resources for subsequent delivery, as a result of teachers’ observation of students’ capacity to complete tasks. Teacher and student behaviours have also been identified as deeply interconnected. In each instance of the curriculum, the alignment of these variables must be carefully considered in relation to each other, and to the intended learning outcomes, scaffolding and the project as a whole. The curriculum model and the criteria established for the evaluation of
congruence thus provide practitioners with mechanisms with which to unpack curriculum, and to establish clarity in their logic for devising project delivery to meet desired student learning outcomes.

The typology provides further structure for decision-making in curriculum development. While the task of project curriculum development has been demonstrated as complex and dynamic, this framework demonstrates that there are also ways in which the overall curriculum system can be linked to the consideration of level-appropriate learning outcomes. In practice, the first stages of curriculum development involve the consideration of intent, based on the context and level of the project. These decisions are often hidden and implicit, making them difficult to articulate and to analyse. The typology provides a straightforward starting point to understanding and implementing the links between intended learning outcomes, program levels, scaffolding and assessment, thereby making the interaction between variables explicit and accessible. The accessibility and viability of the typology, in various iterations, has been tested within my own institution. In particular, it was used as a development tool for the implementation of project methods across the disciplines (for project information, see Lee, 2007). Feedback from teachers was used to refine the language used, and the final iteration has been utilised to create project structures at varying levels of complexity for students in disciplines where there are varying levels of student experience in carrying out projects. Teachers were able to use the typology independently to make explicit decisions about the most appropriate project type. The accreditation and delivery of those projects over the past three years has demonstrated its efficacy for practitioners across the disciplines.

Design educators have tended to work with traditional forms of curriculum. Most often private, there have been few avenues through which they can describe their practice. The analysis of common characteristics provides a sense of the purpose and structure of projects, and a definition of the major features that supports articulation of those practices. These definitions also have significance for professional development, which has largely relied on generic educational theory, and to some extent, has ignored the specific context and needs of design educators. This has been reflected in the literature, which consistently describes design education as ‘different’ from mainstream educational practice. Taken together, the curriculum model, evaluation of congruence, project characteristics and typology provide an empirical basis for professional development tailored to the needs of design educators. As noted above, it further links the needs of design practitioners to the
wider educational discourse, providing a much needed ‘bridge’ for shared understanding and debate.

**Implications for future research**

‘one’s framework needs to be able to map the state of the swamp, and not just the anatomy of its alligators’ (J. Biggs, 1993, p. 74)

Drawing on the systems theory literature, I conceived this study as a contextual study of curriculum as a meso-system. Consideration of meso-systems, while taking into account the contexts and multiple variables in a system, operates at the level of the swamp, rather than the anatomy of the alligators. The scope of such a study limits the degree of depth that can be achieved. This is demonstrably the case with the limits of data and analysis of particular variables and their interaction, especially within a PhD timeframe. More commonly, researchers using existing system models have selected a limited number of variables, and carried out studies regarding their interaction. The kind of research that delves into the influences between the variables has been afforded by the development of the curriculum model, and the questions arising from the analysis of congruence, commonality and variation.

Each of the frameworks presented in this thesis is tentative, drawn from a relatively limited empirical base within a single faculty of design. There is a pressing need to test those models in other contexts, and to establish their stability and efficacy for others. The curriculum model presented in Chapter 3, while workable in its current state, also has a specific teleological problem that needs to be resolved to improve its efficacy as an organising mechanism. The use of the system approach has also provided a fuller picture of the curriculum context than I have been able to examine in detail for this thesis, including the wider social and institutional cultures, program structures, teacher and student backgrounds and beliefs. This identification of systemic contextual influences on the curriculum raises questions about the wider influences on curriculum. In particular, whether there are differences in project types where the context varies from that identified in this study.

Print (1987) argues that progression through levels of complexity forms the basis for development of student learning. In the analysis provided in this chapter, project types appear to accord with a particular purpose related to the level of student capacity and the desire for progressive development of independence and skills. This
was also supported by the analysis of congruence in Chapter 5, which showed that alignment of project scope and complexity with prior student experiences and scaffolding was directly related to student capacity to develop their work.

The nature of this study meant that there were too few in depth cases to make thorough comparisons across disciplines and program levels. What is not yet clear from this analysis, therefore, is whether the project types are necessarily associated with year levels, types of learning aims or subject matter. While it seems logical that there be progression through the project types over a program of study, there were insufficient project cases to establish whether this is necessarily the case. Further, there are indications in the literature that early introduction of more open-ended projects could be equally justified. There is therefore a great deal more scope for research in understanding the way project types are organised across programs and disciplines, and whether there are stable patterns of application linked to teacher, student, discipline or program characteristics.

Teachers’ backgrounds are certainly important. The analysis of congruence presented in Chapter 5 demonstrated that assumptions are held by teachers about the appropriate methods of scaffolding student learning, and their own roles in the project process. More specifically, there were indications that some practices, such as critical reviews, have been brought forward by teachers from their experiences in studio-based education. Further research is needed to understand the decision-making processes employed by teachers when carrying out curriculum development and the impact of the learning and teaching backgrounds of teachers on that process. More in-depth investigation is needed to understand their perspectives regarding the curriculum goals and activities, and the impact of internalised beliefs about the design education process on the curriculum structure and the roles taken by teachers and students in its enactment. The curriculum model presented in this thesis facilitates that future research by providing an organisational structure with which to identify aspects of teacher backgrounds and their relations to particular curriculum variables.

Although observed during class sessions, students were also largely absent from this study in relation to depth of understanding of their learning experience, perspectives and emotional responses to curriculum experiences. There were indications in the findings that students at times found it difficult to interpret project and role expectations beyond the understanding of the required artefact. Nonetheless they consistently attempted to do so. A better understanding of how students navigate and engage with new project experiences and their interpretations of the language of
design projects would better serve to support development of our curriculum and their learning experience.

Assessment practice also remains somewhat of a black box. Findings from this study demonstrated that assessment of design projects is holistic, involving the review of a collection of work produced by students during the project process. As suggested by the literature on assessment in project methods, the integrated and negotiated judgement used by teachers may be part of its effectiveness. The processes employed by teachers to make judgements regarding the quality of student work are still difficult to ascertain. In addition, while the literature on assessment suggests that transparency is important, literature around feedback processes in design has also indicated that students find the language of assessment confusing. Research is needed to more deeply understand the processes and language of assessment in design, and to identify the ways in which holistic assessment practices interact with student learning experience and outcomes.

Finally, the curriculum model has provided the basis for understanding single instances of delivery of curriculum. This provides the baseline data that can further be compared with the impact of shifting content of variables. One question that arises as a result of the findings and the literature is whether theoretical knowledge might be more consistently embedded in the curriculum and syllabus of design education projects, and what effects might be observed on the efficacy of the project system. Another question that might be asked is whether the more explicit articulation and scaffolding of key concepts such as creativity would impact on other areas of the curriculum, and on student learning. Such questions, when based on the underlying concept of the curriculum as a system, also require acknowledgement that the variables are deeply interactive. This prompts further questions about what might be added to and taken out of the curriculum without adversely affecting student experience and outcomes, and how shifts in balance or emphasis impact on other variables.

**Conclusion**

This final chapter of the thesis has presented a review of the purpose and aims of the study and established the significance of the research to the literature and to practitioners. A summary of implications of the methods and findings of this study for further research has also been outlined.
In conclusion, the research presented in this thesis has achieved the aim of providing a greater understanding of the undergraduate design curriculum, and a framework of practical use for design educators. From a personal perspective, it has achieved the aim of bringing to light my own practice as a design educator, and unpacking that practice to identify hidden assumptions as well as what have previously been intuitive responses to the problem of curriculum development and delivery. This has enabled me to conceptualise the project process in constructive ways, to engage more honestly with my own role in the classroom, and to evaluate the impact of behaviours in relation to the intended learning outcomes and on student experience.

The research process itself has developed my ability to carry out academic research, and has taught me, through trial and error, about the importance and challenge of setting manageable study boundaries while maintaining my personal preference for the broader view. It has also strengthened my capacity to identify the complexity of situated events, and to come to terms with the provisional, tentative nature of conclusions. Finally, and importantly, it has presented the opportunity to discover hidden reserves of perseverance and resilience that have seen me through the complexity, setbacks and long trips down wrong roads that are the doctoral experience.
Bibliography


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Davies, A., & Reid, A. (2000). Uncovering problematics in design education: Learning and the design entity. In C. Swann & E. Young (Eds.), *Proceedings of the Re-
inventing Design Education in the University Conference (pp. 178-184). Perth: Curtin University.


Gaston, E. (2007). With current increased demands on staff time and institutional pressures to reduce teaching hours, how little teaching is too little? In A. Boddington & D. Clews (Eds.), Proceedings of the European League of Institutes of the Arts Teachers’ Academy (pp.46-48). Brighton: University of Brighton.


Nini, P. J. (1994). It was good for me, but how about you? Eye, the international review of graphic design, 3(12), unpaged.


Swann, C. (2000). Meanwhile, back at the ranch... In D. Durling & K. Friedman (Eds.), *Doctoral Education in Design* (pp. 73-80). Stoke on Trent: Staffordshire University Press.


Appendix A: Ethical approval and compliance

Note: The ethical approval documents have not been included in this thesis as they include explicit information regarding the location and participants of the study that by the same documents are protected. These documents are held by the Research Office of the awarding institution and are available for scrutiny by examiners.

---

Nicolette Lee  
Faculty of Design  
P25  
29 June, 2006  

Dear Nicolette,

Re: Ethics Approval  
ETHNIDR04/06

I am pleased to advise that your application for ethics approval for project title: A study of the nature of project-based learning in undergraduate Design Education was approved 29/06/2006.

Your project is approved to take place between 20 July 2006 and 15 June 2007.

Please ensure that you only undertake research with human subjects in line with what has been approved. If, at any stage, you wish to extend the level of participation by the participants of the research you must apply for new ethics approval.

The plain language statement and consent form should be printed on Swinburne University letterhead; your supervisor will be able to assist you in this matter.

Please find enclosed a copy of your ethics proposal and approval.

Please contact me if you have any queries.

Yours sincerely,

Dr Deirdre Barron  
Research Coordinator  
National Institute for Design Research  
Swinburne University of Technology  
144 High Street  
Prahran VIC 3181  
Phone +61 3 9214 6091  
Email dbarron@swin.edu.au

Cc Allan Whitfielk
<table>
<thead>
<tr>
<th>Excerpts from ethics approval document <em>(see Appendix A, sections A2, A3 and A4)</em></th>
<th>Actions carried out</th>
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<td><strong>Document review</strong>&lt;br&gt;&quot;examination of course documentation, including official program and course documents, project briefs and teaching materials.&quot;&lt;br&gt;&quot;Copies of completed assessment sheets will be retained. Copies of project outcomes will also be retained where this is feasible.”&lt;br&gt;<strong>All faculty documents collected</strong>&lt;br&gt;<strong>All unit documents collected</strong>&lt;br&gt;<strong>Assessable outcomes reviewed (nature of physical outcomes meant only selected parts of assessable items could be kept by the researcher)</strong></td>
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<td><strong>Observations of classes</strong>&lt;br&gt;&quot;Observations of classroom activity will take place throughout project lifespans focussing on: Frameworks … Pedagogy … Processes … Interactions. … Observations will be recorded using journal notes.”&lt;br&gt;<strong>Classes purposively selected for study</strong>&lt;br&gt;<strong>Notes used and available to teachers throughout observations (able to correct/clarify intent)</strong>&lt;br&gt;<strong>Students advised at first encounter of research purpose and methods. Withdrawal of researcher where this condition threatened. Students observed and actions recorded but not identified</strong></td>
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<td><strong>Interviews with teachers</strong>&lt;br&gt;&quot; … open-structured interviews with the teacher, which will aim to elicit information about their interpretations of these documents, intentions regarding student learning, strategies they will employ to support learning, and processes that they anticipate students will undergo during project execution.”&lt;br&gt;&quot; … interviews will be recorded using journal notes.&quot;&lt;br&gt;&quot;Data that is to be used for analysis will be made available to participants at the conclusion of this phase, with right of edit”&lt;br&gt;<strong>Open/semi-structured approach taking into account topics of interest (prompt sheets used for initial part of interviews</strong>&lt;br&gt;<strong>All interviews recorded using notes</strong>&lt;br&gt;<strong>Notes used and available to teachers throughout (able to correct/clarify intent)</strong></td>
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</table>
| **Confidentiality and risk avoidance**<br>"The researcher will not divulge practices, conversations or any information regarding the views or practices of the participants, nor comment on them outside of the regard of this study, excepting where this constitutes a legal requirement, where actions pose an immediate danger to others, or there is a breach of the University Duty of Care to students and staff. These undertakings will also be reiterated in the plain language statement project description.”<br>"Any reasonable steps to avoid discomfort (to students due to the presence of the researcher) or unnecessary presence by the researcher will be undertaken.<br>**Statements and consent forms completed and signed by teachers for both interviews and observations**<br>**Plain language statements and consent forms completed for both interviews and observations**<br>**Students observed and actions recorded but not identified** | **Students at T & L sessions observed by the researcher advised at first encounter of research purpose and methods. Withdrawal of researcher where this condition threatened.**
Appendix B: Prompts for teacher interviews

BACKGROUND INFORMATION
1) Gender/Age
2) Discipline
3) Years in professional practice
4) Most recent professional practice
5) Years teaching in higher ed
6) Disciplines/types of higher ed teaching
7) Other teaching experiences

THE PROJECT
8) What are the aims and objectives of the unit?
9) What are the aims and objectives of the project?
10) What teaching methods do you use?
11) What learning activities are used?
12) What are the assessment criteria?

REFLECTIONS
13) What skills, knowledge, behaviours or attributes do you feel have been the primary outcomes for students undertaking this project?
14) Are there other learning outcomes in relation to carrying out the projects?
15) What are the important curriculum structures that support those learning outcomes?
16) What are the influences on how well students achieve the learning outcomes?
17) What are the most important things you look for in assessment?
18) How do you go about making judgements?
## Appendix C: Condensed data tables

### Table 1. Context system variables

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<th>Educational context</th>
<th>Organisation structure</th>
<th>Faculty structure</th>
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<td><strong>Institution</strong></td>
<td>Metropolitan university, focus on vocational outcomes and employability, research growth, limited funding and high student growth, policy emphasis on examination outcomes. Increasing emphasis on professional learning including work-based learning, team-based learning and experiential education.</td>
<td>Faculty of Design with disciplines of graphic design.</td>
</tr>
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<td><strong>Prevailing culture</strong></td>
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<tr>
<td><strong>Faculties with discrete budgets based on student numbers, scheduled classes (no studio facilities), four units per semester, weekly contact per unit of between 3-5 hours unless justified. Central accreditation of programs requiring inclusion of professional learning activities and requirements for explicit assessment and learning objectives in each unit of study.</strong></td>
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<td>digital media design, product design, interior design. Additional related and shared</td>
<td>Three year bachelor of design, optional one year industry placement and/or honours year. Discipline specific units plus three interdisciplinary units taken across three years of undergraduate program. Additional options for small range of elective study units in other faculties. Each program with coordinator responsible for continuity across units, each unit designed by individual staff member.</td>
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<td>Case A (int)</td>
<td>(IBL) program in third year for some undergraduate students (one year professional experience).</td>
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<td><strong>Case B (Comm)</strong></td>
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<td>First year introduction to graphic design, delivered semester two. Follows from similar first semester unit, but this is not considered critical.</td>
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<td>Total 72 hours contact, cohort of 30, one teacher and one contract staff member assigned one class each. Two adjoining teaching rooms allocated, simultaneous timetabling, with access to portable projector.</td>
<td>Total 48 hours contact, cohort of 48, one teacher and one contract staff member assigned one class each. Two adjoining teaching rooms allocated for classes, simultaneous timetabling, with access to portable projector.</td>
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<td>Entry</td>
<td>Entry through completion or approved equivalency of two years undergraduate study in same discipline, with similar coverage to the faculty program.</td>
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Table 2. People system variables

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<td>Week 14. Weighted components: sketch diagramming 30%, development of ideas 20%, documentation 40%, formatting and visual presentation 10%. Presentations not graded.</td>
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<td>Week 3 submission, conclusion of project. Print portfolio and Blackboard upload of digital file to a maximum of 6xA3 pages. Gathered materials. Agreed definition of word. 1 x A3 group mapping document. 1 x A3 group visual outcomes (4 images per student).</td>
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